United States
Department of
Agriculture

In cooperation
with Texas
AgriLife
Research

Natural
Resources
Conservation
Service

Soil Survey of McMullen County, Texas

How To Use This Soil Survey

General Soil Map

The general soil map, which is a color map, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

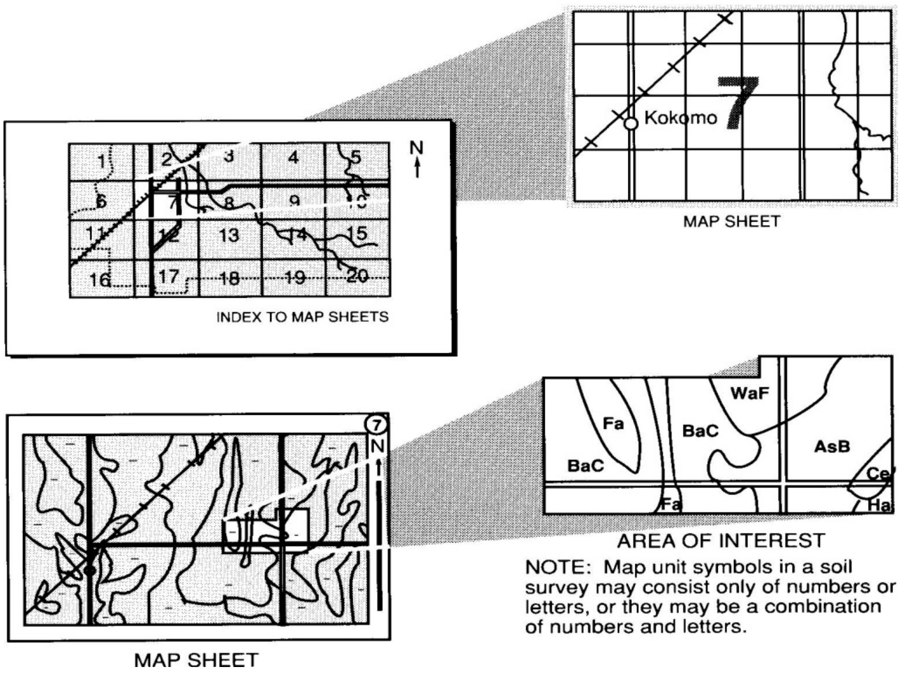
Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and go to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Go to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.



NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including AgriLife Research, and local agencies. The Natural Resources Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 2010. Soil names and descriptions were approved in 2010. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 2010. This survey was made cooperatively by the Natural Resources Conservation Service and the Texas AgriLife Research. The survey is part of the technical assistance furnished to the McMullen County Soil and Water Conservation District cooperatively by the Natural Resources Conservation Service and Texas AgriLife Research. The survey is part of the technical assistance furnished to the McMullen County Soil and Water Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

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Cover: Whitsett-Picosa complex, 1 to 8 percent slopes. A scenic vista on top of a cuestas on the Whitsett Formation in the Jackson Group. This land makes excellent habitat for wildlife.

Additional information about the Nation’s natural resources is available on the Natural Resources Conservation Service homepage on the World Wide Web. The address is http://www.nrcs.usda.gov

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Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or Texas AgriLife Extension Service.

Salvador Salinas

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State Conservationist
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Soil Survey of McMullen County, Texas

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United States Department of Agriculture, Natural Resources Conservation Service,
in cooperation with
Texas AgriLife Research

McMullen County is in the heart of the brush country in South Texas (fig. 1). It borders Frio County to the west, Atascosa County to the north, Live Oak County to the east, and Duval County to the south. The county is rectangular in shape and measures about 28 miles from west to east and about 41 miles from north to south. It has an area of 1,164 square miles or about 745,101 acres. The McMullen County seat is named Tilden, which is located just south of the Frio River at the intersection of Texas State Highways 16 and 72, about 65 miles south of San Antonio, Texas.

The survey is located in the Southwest Plateaus and Plains Range and Cotton Region (Major Land Resource Region I). The county is located entirely in the MLRA 83 Rio Grande Plain Major Land Resource Area, and is intersected by three subsets; MLRA 83A—Northern Rio Grande Plain, MLRA 83B—Western Rio Grande Plain, and MLRA 83C—Central Rio Grande Plain. Approximately twenty six percent of the county is located within MLRA 83A, forty-two percent is located within MLRA 83B, and thirty-two percent is located within MLRA 83C.

The topography of McMullen County is a gently undulating plain dipping toward the Gulf of Mexico. Elevations range from 134 to 685 feet above sea level. The lowest elevation is located on the flood plain of the Nueces River as it drains to the east at the Live Oak County line. The highest elevation is on an exposure of the Goliad Formation in the southeastern portion of the county, east of Texas State Highway 16 just north of the Duval County line. The Frio and Nueces Rivers, drain a third of the Rio Grande Plain into the Gulf of Mexico, flow from the west to east across the county dissecting tertiary aged sediments. The rivers have carved through soft mudstones creating broad drainages and flood plains. The more resistant sediment, such as sandstone, can be seen from miles away as low hills, mesas, and cuestas.

The major land use in McMullen County is rangeland. Raising cattle provides the majority of the range economy, which is supplemented by the oil and gas industry and hunting leases. Less than two percent of the county is used as industrial sites, urban areas, and recreational facilities. The soils are dominantly dark-colored clayey and light-colored loamy soils with many of the clayey soils being either sodic or saline.

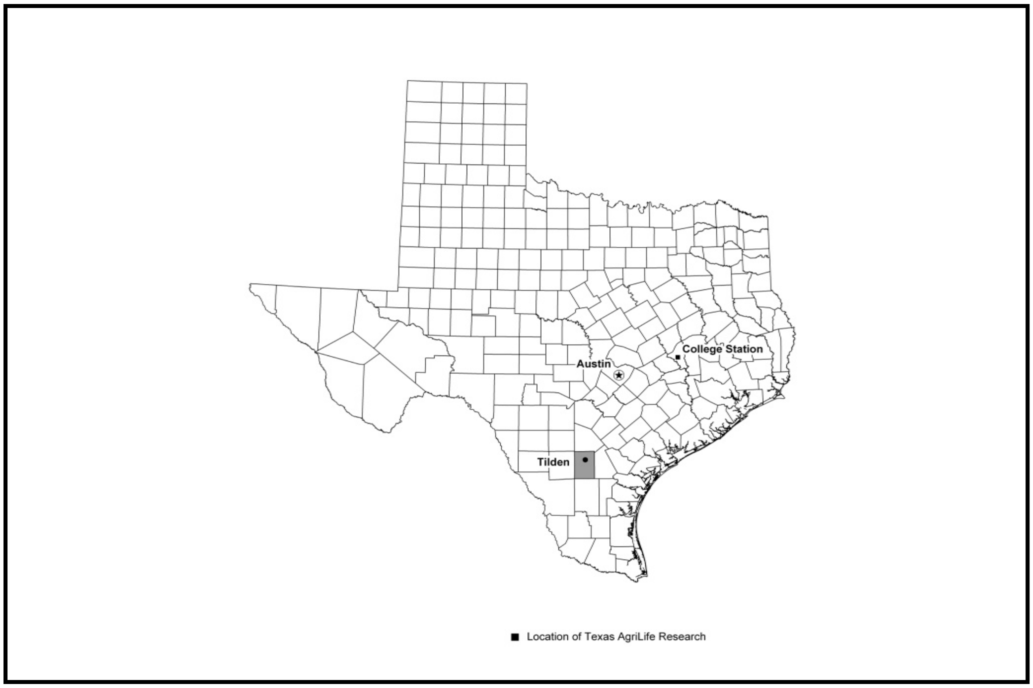

Figure 1.—Location of McMullen County, Texas. College Station is headquarters of the Texas AgriLifeResearch. Austin is the capitol of Texas.

General Nature of the Survey Area

This section provides general information about McMullen County. It describes the history, economy, transportation, natural resources, and climate of the county.

History

It is estimated that the areas around present day McMullen County were inhabited by humans, as long as 11,000 years ago. Archeological evidence has shown that hunter-gather Paleo Indians subsisted on wild game and fruits, seeds and roots of the native plant communities. The Indians carved tools from wood and stone to aid in daily chores necessary for their survival. (Hester, 1980)

The Spanish arrived in the early 1700’s and contributed to pressure put on the native American tribes in the region, such as the Coahuiltecan Indians, to leave the area. This period brought disease and war to what had been a seemingly peaceful and healthy nation. The Indians found refuge from disease and war in the missions being established and were likely part of the San Juan Bautista mission in Coahuila. (Hester, 1980)

Permanent settlements were not established until the early 19th century when the San Antonio-Laredo Road was cut through the northwest corner of the county, providing travelers safe passage over the Frio River.

Land grants were given by both the Republic of Mexico after the Mexican War of Independence and again after the Texas Revolution and the Mexican War of 1846-48. The southern half of McMullen County coined the “Nueces Strip”, was in disputed territory between the newly founded republic of Texas and Mexico. In 1828, John McMullen and James McGloin traveled to the area with 200 catholic immigrants. The grants were never settled but the people remained in the area and begin to establish small communities. (Hester, 1980)

McMullen County was created in 1858 and organized in 1862. Bandits and isolated population centers caused it to be abandoned in 1870. The county reorganized in 1877 with Tilden as the county seat. Tilden was named for Samuel J. Tilden who was a candidate for president in the 1876 election. The settlement was originally called the Rio Frio, then Dog Town after the faithful working dogs that participated in “cow hunts” with the locals. (Hester, 1980)

Barb wire fence was introduced in the 1880’s and the ranching business has been the dominate part of the county’s economy ever since this time. Early in the 20th century agriculture was introduced through irrigation practices along the San Miguel Creek and the Nueces and Frio Rivers. Cotton, corn, and sorghum were planted most often. (Hester, 1980)

Economy

Ranching, wildlife, and oil and gas are the county’s leading industries. Oil was discovered in McMullen County in the early part of the 20th century and the first natural gas well was discovered in 1915. Oil was first struck in 1922 and has been actively produced on and off over the last 100 years. Recently, an oil and natural gas deposit was tapped into using new technologies such as lateral fracking to release crude oil from the Eagle Ford Shale Formation, which can be found as deep as 11,000 feet below ground. This boom has been lucrative for many of mineral rights owners in McMullen County and has helped bolster the local economy. Cattle sales and hunting leases are the largest source of agricultural revenue in the county.

Transportation

McMullen County is served by Texas Highway 16 which crosses the county from north to south and Texas Highway 72 which crosses the county from east to west. The two highways intersect just north of Tilden. Texas Highway 97 travels the northwestern county line from north to south between LaSalle County and McMullen County before intersecting with Texas Highway 72 just east of Fowlerton, and veering west into LaSalle County. Farm to Market Roads 624, 1962, 3445, and 791 also traverse the county providing access to rural areas along with a few other county roads. The county has several private landing strips but no municipal airports. There are no railroads in McMullen County.

Natural Resources

The most important natural resources in McMullen County are soil, water, wildlife, petroleum, and natural gas. Also deposits of gravel, caliche, and clay are used for the construction of roads, buildings, and ponds.

Mining operations include Zeolite and lignite coal. Zeolite (or locally Kaline) is mined in in the central part of the county. Zeolite is used as an absorbent in products such as kitty litter. Lignite coal is mined in the northern portion of McMullen County. The mine is owned by the San Miguel Electric Cooperative and is operated by the North American Coal Cooperation. The mine produces 3.25 million tons of lignite coal annually and reclaims about 300 acres a year. (nacoal.com)

The Choke Canyon Reservoir is located in the eastern portion of the county and dams the Frio River and its tributaries. The reservoir was built in 1982 by the Bureau of Reclamation. The reservoir provides drinking water for the City of Corpus Christi.

Wildlife in the county provides opportunities for recreation and income. White-tailed deer, javelina, wild turkeys, quail, and dove are the major game species in the county. Stock tanks, the Nueces and Frio Rivers, and San Miguel Creek provide habitat for game fish. Choke Canyon Reservoir has become a hotspot for largemouth and white bass fisherman across the southern United States.

Climate

Prepared by the Natural Resources Conservation Service National Water and Climate Center, Portland, Oregon

Climate tables are created from climate station Tilden 4 SSE Texas

Thunderstorm days, relative humidity, percent sunshine, and wind information are estimated from First Order station San Antonio, Texas.

Table 1 provides data on temperature and precipitation for the survey area as recorded at Tilden 4 SSE in the period 1971 to 2000. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on the length of the growing season.

In winter, the average temperature is 56 degrees F and the average daily minimum temperature is 43 degrees. The lowest temperature on record, which occurred at Tilden 4 SSE on December 23, 1989, is 5 degrees. In summer, the average temperature is 85 degrees and the average daily maximum temperature is 97 degrees. The highest temperature, which occurred at Tilden 4 SSE on July 2, 1910, is 119 degrees.

Growing degree days are shown in Table 1. They are equivalent to "heat units". During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The average annual total precipitation is about 23 inches. Of this, about 21 inches, or 90 percent, usually falls in February through November. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 6.93 inches at Tilden 4 SSE on September 22, 1967. Thunderstorms occur on about 37 days each year, and most occur in May.

The average relative humidity in mid-afternoon is about 52 percent. Humidity is higher at night, and the average at dawn is about 84 percent. The sun shines 71 percent of the time in summer and 48 percent in winter. The prevailing wind is from the south-southeast. Average wind speed is highest, 10 miles per hour, in April.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

The descriptions, names, and delineation’s of the soils in this survey area do not fully agree with those of the soils in adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

General Soil Map Units

The general soil map in this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one map unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Very Deep, Deep, and Moderately Deep, Clayey and Loamy Soils on Interfluves and Stream Terraces

1—Montell-Esseville-Cotulla

Setting

General location: Predominantly in the northern and central part of the county within the Northern and Western Rio Grande Plains
Major land resource area: MLRA 83B—Western Rio Grande Plain and MLRA 83A—Northern Rio Grande Plain
Elevation: 180 to 500 feet

Composition

Percent of survey area: 21
Montell and similar soils: 46
Esseville and similar soils: 26
Cotulla and similar soils: 20
Contrasting soils: Moglia, Maverick, and Brundage

Soil Descriptions

Landscape: Inland, dissected coastal plains (fig. 2)
Landform: Montell—Valley floors; Esseville and Cotulla—Interfluves
Parent material: Montell—Clayey alluvium; Esseville—Clayey fluviomarine deposits over saline clayey marine deposits derived from mudstone; Cotulla—Calcareous clayey residuum weathered from shale

Typical Profiles

Montell

A—0 to 17 inches; moderately alkaline clay
Bnss—17 to 39 inches; moderately alkaline clay
Bkyz—39 to 80 inches; moderately alkaline clay

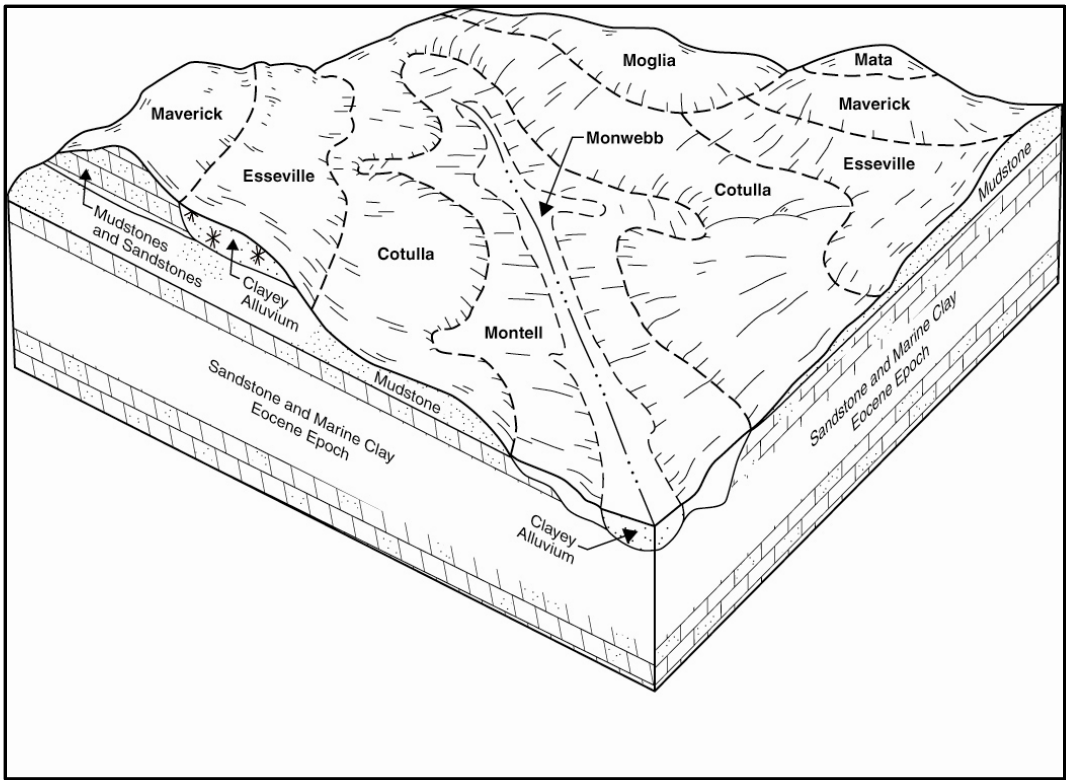
Moglia
Mata
Maverick
Maverick
Esseville
Esseville
Monwebb
Cotulla
Cotulla
Montell
Mudstones and Sandstones
Clayey Alluvium
Sandstone and Marine Clay Eocene Epoch
Mudstone
Clayey Alluvium
Sandstone and Marine Clay Eocene Epoch
Mudstone

Figure 2.—Patterns and underlying material of the Montell-Esseville-Cotulla general soils map unit.

Esseville

A—0 to 10 inches; slightly alkaline clay
Bss—10 to 24 inches; slightly alkaline clay
Bkssyz—24 to 34 inches; slightly alkaline clay
2Cdyz—34 to 80 inches; slightly alkaline gypsiferous clay

Cotulla

A—0 to 4 inches; moderately alkaline clay loam
Bss—4 to 60 inches; moderately alkaline clay
Cdyz—60 to 80 inches; moderately alkaline clay

Properties and Qualities

Slope: Montell—0 to 3 percent; Esseville—1 to 5 percent; Cotulla—1 to 3 percent
Percent of area covered by surface fragments: Less than 1 percent subrounded gravel
Depth to first restrictive layer: Montell—No restrictive layer; Esseville—34 inches to densic bedrock; Cotulla—57 to 64 inches to dense material
Slowest soil permeability to 60 inches, above first cemented restrictive layer: Very slow
Slowest permeability from first cemented restrictive layer to 60 inches: Esseville and Cotulla—Very slow
Salinity, representative within 40 inches: Montell and Esseville—Saline; Cotulla—Nonsaline
Salinity, maximum within 40 inches: Saline
Sodicity, representative within 40 inches: Sodic
Sodicity, maximum within 40 inches: Sodic

Representative total available water capacity to 60 inches: Montell—About 8.5 inches (moderate); Esseville—About 7.0 inches (moderate); Cotulla—About 5.6 inches (low);
Natural drainage class: Montell—Moderately well drained; Esseville and Cotulla—Well drained
Runoff: Montell—High; Esseville—Very high; Cotulla—Medium
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: Montell—6s; Esseville—2e; Cotulla—4s
Land capability irrigated: Montell—3e; Esseville—None specified; Cotulla—3s
Ecological site name: Montell—Clay Flat 18-25" PZ; Esseville and Cotulla—Saline Clay 18-25" PZ
Typical vegetation: Vine mesquite, alkali sacaton, tobosagrass, whiplash pappusgrass, curly-mesquite, multiflower false Rhodes grass, buffalograss, false Rhodes grass, Arizona cottontop, other shrubs, other perennial forbs, white tridens

Use and Management

Major land uses: The major land uses for this soil are livestock grazing, forage production, and wildlife habitat.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

2—Dosrios-Campbellton-Esseville

Setting

General location: Predominantly in the northern, central, and western part of the county within the Northern Rio Grande Plain
Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 160 to 540 feet

Composition

Percent of survey area: 13
Dosrios and similar soils: 38
Campbellton and similar soils: 32
Esseville and similar soils: 21
Contrasting soils: Whitsett, Picosa, and Weigang

Soil Descriptions

Landscape: Inland, dissected coastal plains (fig. 3)
Landform: Dosrios—Broad interfluves; Campbellton and Esseville—Interfluves
Parent material: Dosrios—Moderately saline clayey fluviomarine deposits over clayey residuum weathered from mudstone; Campbellton—Loamy residuum weathered from shale; Esseville—Saline clayey fluviomarine deposits over saline clayey marine deposits derived from mudstone

Typical Profiles

Dosrios

A—0 to 8 inches; moderately alkaline clay
Bss—8 to 30 inches; moderately alkaline clay
Bkyz—30 to 70 inches; moderately alkaline clay
2Cdyz—70 to 80 inches; moderately alkaline clay

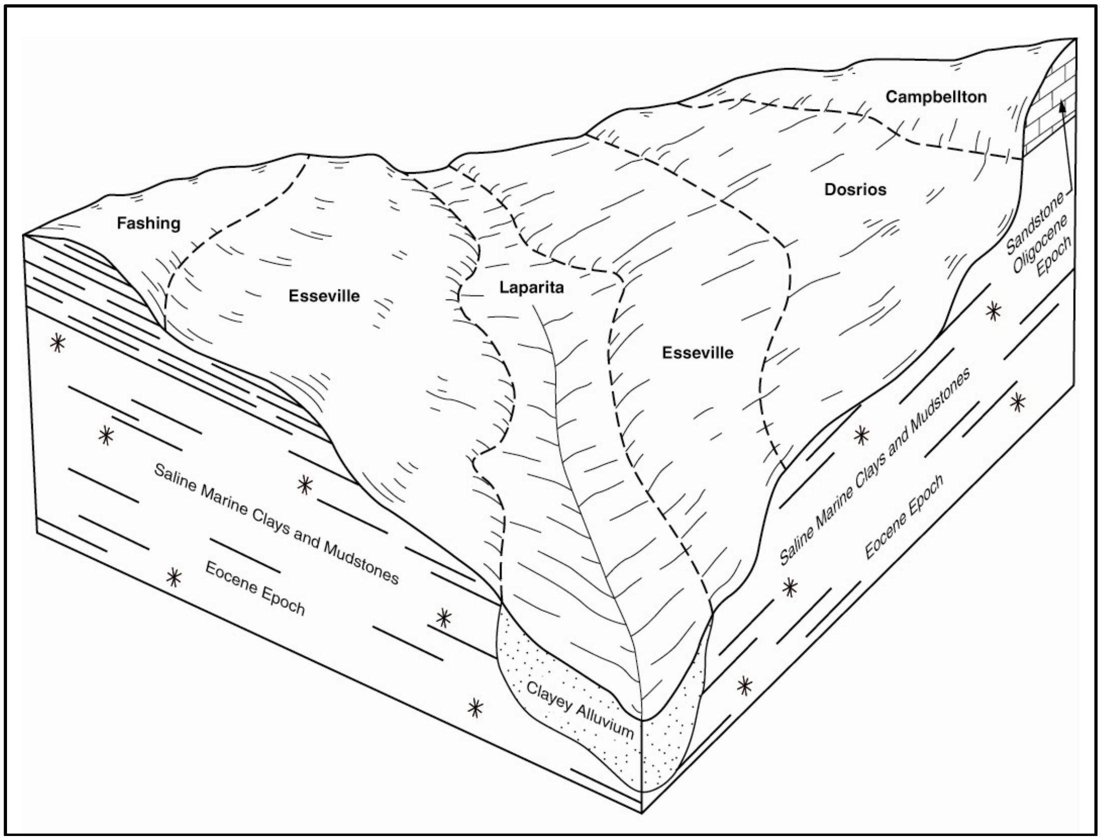
Fashing
Esseville
Laparita
Esseville
Dosrios
Campbellton
Sandstone Oligocene Epoch
Saline Marine Clays and Mudstones
Eocene Epoch
Clayey Alluvium
Saline Marine Clays and Mudstones
Eocene Epoch

Figure 3.—Patterns and underlying material of the Dosrios-Campbellton-Esseville general soils map unit.

Campbellton

A—0 to 5 inches; moderately alkaline clay loam
Btk—5 to 28 inches; moderately alkaline clay
BCkz—28 to 63 inches; moderately alkaline clay loam

Esseville

A—0 to 10 inches; slightly alkaline clay
Bss—10 to 24 inches; slightly alkaline clay
Bkssyz—24 to 34 inches; slightly alkaline clay
2Cdyz—34 to 80 inches; slightly alkaline gypsiferous clay

Properties and Qualities

Slope: Dosrios and Campbellton—1 to 3 percent; Esseville—1 to 5 percent
Percent of area covered by surface fragments: Less than 1 percent subrounded gravel
Depth to first restrictive layer: Dosrios—60 to 78 inches to dense material; Campbellton—60 to 78 inches to densic bedrock; Esseville—34 inches to densic bedrock
Slowest soil permeability to 60 inches, above first cemented restrictive layer: Dosrios and Esseville—Very slow; Campbellton—Moderately slow
Slowest permeability below the first cemented restrictive layer to 60 inches: Esseville—Very slow
Salinity, representative within 40 inches: Dosrios—Non-saline; Campbellton and Esseville—Saline
Salinity, maximum within 40 inches: Saline
Sodicity, representative within 40 inches: Sodic

Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: Dosrios—About 9.3 inches (high); Campbellton—About 7.0 inches (moderate); Esseville—About 7.0 inches (moderate)
Natural drainage class: Dosrios—Moderately well drained; Campbellton and Esseville—Well drained
Runoff: Dosrios—Medium; Campbellton—Low; Esseville—Very high
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: Dosrios—3s; Campbellton—2e; Esseville—2e
Land capability irrigated: Dosrios—3e; Campbellton—2e; Esseville—None specified
Ecological site name: Dosrios—Saline Clay 18-25" PZ; Campbellton—Saline clay loam 22-35" PZ; Esseville—Saline Clay 18-25" PZ
Typical vegetation: Other perennial grasses, pinhole bluestem, plains lovegrass, sideoats grama, Texas cupgrass, vine mesquite, buffalograss, plains bristlegrass, curly-mesquite, Texas wintergrass, false Rhodes grass, other perennial forbs, other annual forbs

Use and Management

Major land uses: The major land uses for this soil are livestock grazing, forage production, and wildlife habitat.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

3—Campbellton-Whitsett

Setting

General location: Predominantly in the central and northern part of the county within the Northern Rio Grande Plain
Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 195 to 490 feet

Composition

Percent of survey area: 7
Campbellton and similar soils: 45
Whitsett and similar soils: 43
Contrasting soils: Esseville, Picosa, and Dosrios

Soil Descriptions

Landscape: Inland, dissected coastal plains
Landform: Interfluves
Parent material: Campbellton—Loamy residuum weathered from shale; Whitsett—Loamy residuum weathered from sandstone and shale

Typical Profiles

Campbellton

A—0 to 5 inches; moderately alkaline clay loam
Btk—5 to 28 inches; moderately alkaline clay
BCkz—28 to 63 inches; moderately alkaline clay loam

Whitsett

A—0 to 4 inches; slightly alkaline fine sandy loam
Bt—4 to 13 inches; moderately alkaline sandy clay loam
Btk—13 to 31 inches; moderately alkaline clay loam
Cr—31 to 41 inches; bedrock

Properties and Qualities

Slope: Campbellton—1 to 3 percent; Whitsett—1 to 5 percent
Percent of area covered by surface fragments: Whitsett—Less than 1 percent angular gravel
Depth to first restrictive layer: Campbellton—60 to 78 inches to densic bedrock; Whitsett—20 to 40 inches to paralithic bedrock
Slowest soil permeability to 60 inches, above first cemented restrictive layer: Campbellton—Moderately slow; Whitsett—Slow
Salinity, representative within 40 inches: Campbellton—Saline; Whitsett—Non-saline
Salinity, maximum within 40 inches: Campbellton—Saline; Whitsett—Non-saline
Sodicity, representative within 40 inches: Campbellton—Sodic; Whitsett—Not sodic
Sodicity, maximum within 40 inches: Campbellton—Sodic; Whitsett—Not sodic
Representative total available water capacity to 60 inches: Campbellton—About 7.0 inches (moderate); Whitsett—About 3.9 inches (low)
Natural drainage class: Well drained
Runoff: Campbellton—Low; Whitsett—Medium
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: Campbellton—2e; Whitsett—2e
Land capability irrigated: Campbellton—2e; Whitsett—None specified
Ecological site name: Campbellton—Saline clay loam 22-35" PZ; Whitsett—Shallow 18-25" PZ
Typical vegetation: Pink pappusgrass, other perennial grasses, pinhole bluestem, plains bristlegrass, plains lovegrass, multiflower false Rhodes grass, false Rhodes grass, Arizona cottontop, buffalograss, curly-mesquite, other shrubs, other perennial forbs, sideoats grama

Use and Management

Major land uses: The major land uses for this soil are livestock grazing, forage production, and wildlife habitat.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

4—Montell-Aguilares-Moglia

Setting

General location: Predominantly in the southwestern, western, and northern part of the county in the Western Rio Grande Plain
Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 185 to 470 feet

Composition

Percent of survey area: 4
Montell and similar soils: 35

Aguilares and similar soils: 25
Moglia and similar soil: 17
Contrasting soils: Brundage, Tela, and Viboras

Soil Descriptions

Landscape: Inland, dissected plains (fig.4)
Landform: Montell—Valley floors; Aguilares and Moglia—Interfluves
Parent material: Montell—Clayey alluvium; Aguilares—Calcareous loamy residuum weathered from sandstone; Moglia—Calcareous, saline loamy residuum weathered from shale

Typical Profiles

Montell

A—0 to 17 inches; moderately alkaline clay
Bnss—17 to 39 inches; moderately alkaline clay
Bkyz—39 to 80 inches; moderately alkaline clay

Aguilares

A—0 to 4 inches; moderately alkaline fine sandy loam
Bk—4 to 12 inches; moderately alkaline fine sandy loam
Bkz—12 to 39 inches; moderately alkaline sandy clay loam
Bknz—39 to 80 inches; moderately alkaline sandy clay loam

Moglia

A—0 to 7 inches; moderately alkaline sandy clay loam
Bk—7 to 30 inches; moderately alkaline clay loam

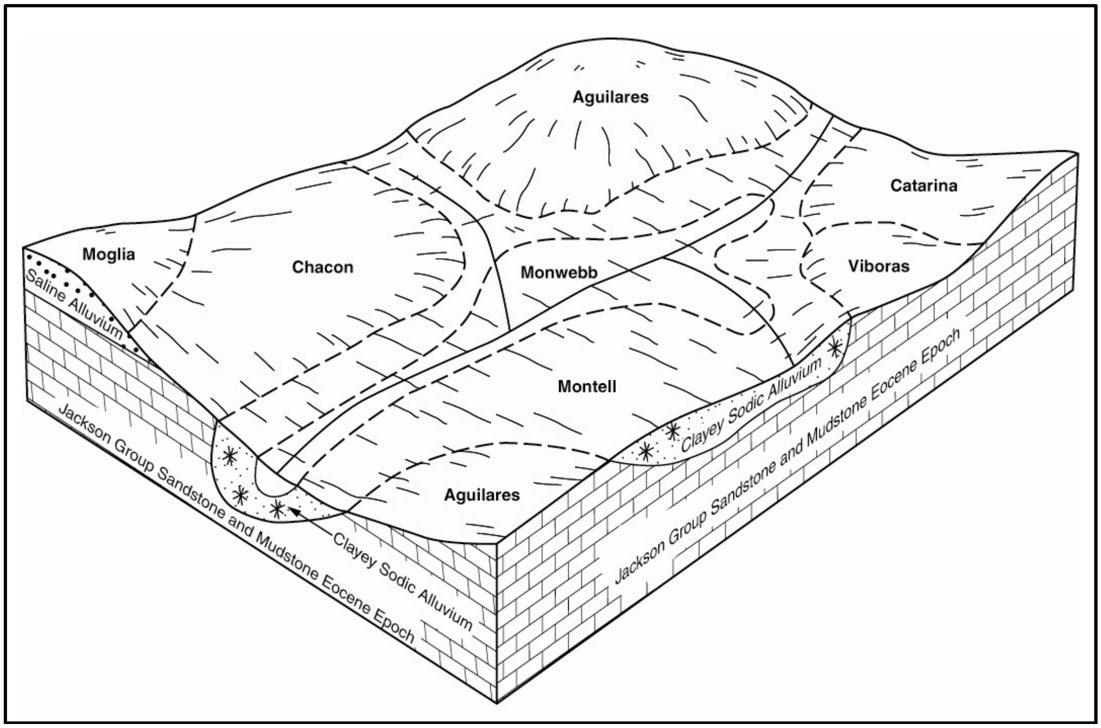
Aguilares
Catarina
Moglia
Chacon
Monwebb
Viboras
Saline Alluvium
Montell
Clayey Sodic Alluvium
Aguilares
Jackson Group Sandstone and Mudstone Eocene Epoch
Clayey Sodic Alluvium
Jackson Group Sandstone and Mudstone Eocene Epoch

Figure 4.—Patterns and underlying material of the Montell-Aguilares-Moglia general soils map unit.

Bknz—30 to 54 inches; moderately alkaline clay loam
2Bknyz—54 to 60 inches; moderately alkaline loam
2Bnyz—60 to 80 inches; moderately alkaline clay loam

Properties and Qualities

Slope: Montell and Aguilares—0 to 3 percent; Moglia—1 to 5 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: Montell—Very slow; Aguilares—Moderate; Moglia—Moderately slow
Salinity, representative within 40 inches: Montell—Saline; Aguilares and Moglia—Non-saline
Salinity, maximum within 40 inches: Montell and Aguilares—Saline; Moglia—Non-saline
Sodicity, representative within 40 inches: Montell—Sodic; Aguilares and Moglia—Not sodic
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: Montell—About 8.5 inches (moderate); Aguilares—About 5.3 inches (low); Moglia—About 5.9 inches (low)
Natural drainage class: Montell—Moderately well drained; Aguilares and Moglia—Well drained
Runoff: Montell—High; Aguilares and Moglia—Low
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: Montell—6s; Aguilares—4e; Moglia—6e
Land capability irrigated: Montell—3e; Aguilares—2e; Moglia—None specified
Ecological site name: Montell—Clay Flat 18-25" PZ; Aguilares—Gray Loamy Upland 18-25" PZ; Moglia—Saline Clay Loam 18-35" PZ
Typical vegetation: Pink pappusgrass, buffalograss, curly-mesquite, plains bristlegrass, whiplash pappusgrass, alkali sacaton, false Rhodes grass, other perennial forbs, other perennial grasses, sideoats grama, Texas wintergrass, tobosagrass, vine mesquite, white tridens

Use and Management

Major land uses: The major land uses for this soil are livestock grazing, forage production, and wildlife habitat.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

5—Maverick-Cotulla

Setting

General location: Predominantly in the northern and western part of the county within the Western Rio Grande Plain
Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 225 to 620 feet

Composition

Percent of survey area: 3
Maverick and similar soils: 52
Cotulla and similar soils: 31
Contrasting soils: Brundage, Moglia, and Imogene

Soil Descriptions

Landscape: Inland, dissected coastal plains
Landform: Interfluves
Parent material: Calcareous clayey residuum weathered from shale

Typical Profiles

Maverick

A—0 to 15 inches; moderately alkaline clay
Bkyz—15 to 33 inches; moderately alkaline clay
BC—33 to 38 inches; moderately alkaline clay
Cd—38 to 80 inches; moderately alkaline clay

Cotulla

A—0 to 4 inches; moderately alkaline clay loam
Bss—4 to 60 inches; moderately alkaline clay
Cdyz—60 to 80 inches; moderately alkaline clay

Properties and Qualities

Slope: 1 to 3 percent
Depth to first restrictive layer: Maverick—24 to 43 inches to densic bedrock; Cotulla—57 to 64 inches to dense material
Slowest soil permeability to 60 inches, above first cemented restrictive layer: Maverick—Slow; Cotulla—Very slow
Slowest permeability from first cemented restrictive layer to 60 inches: Very slow
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Saline
Sodicity, representative within 40 inches: Sodic
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: Maverick—About 5.6 inches (low); Cotulla—About 5.6 inches (low)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: Maverick—6e; Cotulla—4s
Land capability irrigated: Maverick—4s; Cotulla—3s
Ecological site name: Maverick—Rolling Hardland 18-25" PZ; Cotulla—Saline Clay 18-25" PZ
Typical vegetation: Pink pappusgrass, buffalograss, false Rhodes grass, other perennial grasses, plains bristlegrass, alkali sacaton, Arizona cottontop, curly-mesquite, other shrubs, other perennial forbs, pinhole bluestem, tobosagrass

Use and Management

Major land uses: The major land uses for this soil are livestock grazing, forage production, and wildlife habitat.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

Very Deep, Deep, and Moderately Deep, Loamy Soils on Interfluves, Paleoterraces, and Erosion Remnants

6—Houla-Salco-Lomart

Setting

General location: Predominantly in the southern, central, and eastern part of the county within the Central Rio Grande Plain
Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 300 to 700 feet

Composition

Percent of survey area: 17
Houla and similar soils: 41
Salco and similar soils: 22
Lomart and similar soils: 16
Contrasting soils: Tela, Verick, and Mirasol

Soil Descriptions

Landscape: Inland, dissected coastal plains (fig. 5)
Landform: Houla—erosion remnants; Salco and Lomart—interfluves
Parent material: Houla—Residuum from calcareous, tuffaceous sandstone; Salco—Loamy, calcareous, alluvium and/or tuffaceous residuum; Lomart—Residuum from noncalcareous tuffaceous sandstone

Typical Profiles

Houla

A—0 to 7 inches; moderately alkaline clay loam
Bw—7 to 15 inches; moderately alkaline clay loam
Bk—15 to 58 inches; moderately alkaline fine sandy loam
Ck—58 to 80 inches; moderately alkaline fine sandy loam

Salco

A—0 to 5 inches; moderately alkaline fine sandy loam
Bt—5 to 10 inches; moderately alkaline clay loam
Btk—10 to 45 inches; moderately alkaline sandy clay loam
Bk—45 to 80 inches; moderately alkaline fine sandy loam

Lomart

A—0 to 8 inches; moderately alkaline loam
Bk—8 to 24 inches; moderately alkaline fine sandy loam
Cr—24 to 80 inches; bedrock

Properties and Qualities

Slope: Houla and Salco soils—1 to 3 percent; Lomart—1 to 5 percent
Depth to first restrictive layer: Houla and Salco soils—No restrictive layer; Lomart—20 to 40 inches to paralithic bedrock
Slowest soil permeability to 60 inches, above first cemented restrictive layer: Moderate
Slowest permeability from first cemented restrictive layer to 60 inches: Lomart—Moderate
Salinity, representative within 40 inches: Non-saline

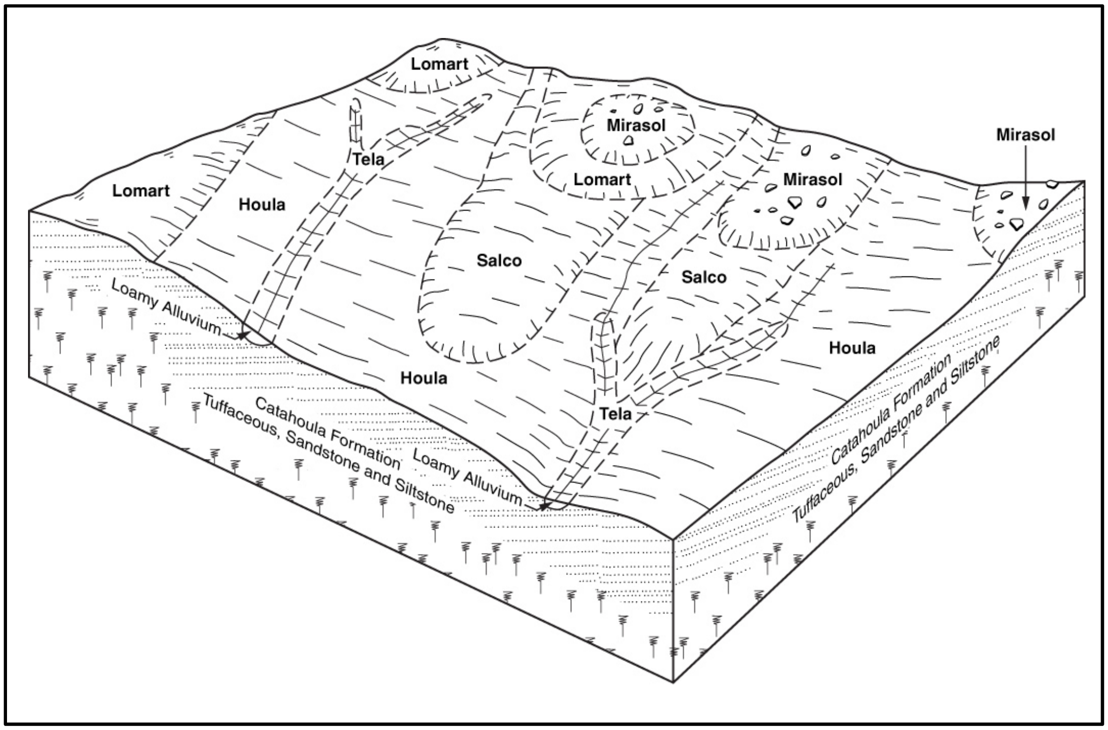
Lomart
Mirasol
Mirasol
Mirasol
Tela
Lomart
Lomart
Houla
Salco
Salco
Houla
Houla
Tela
Loamy Alluvium
Loamy Alluvium
Catahoula Formation
Tuffaceous, Sandstone and Siltstone
Catahoula Formation
Tuffaceous, Sandstone and Siltstone

Figure 5.—Patterns and underlying material of the Houla-Salco-Lomart general soils map unit.

Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: Houla—About 10.7 inches (high); Salco—About 9.5 inches (high); Lomart—About 3.1 inches (low)
Natural drainage class: Well drained
Runoff: Houla and Lomart soils—Low; Salco—Very low
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: Houla—3s; Salco—2s; Lomart—6e
Land capability irrigated: Houla—None specified; Salco—None specified; Lomart—None specified
Ecological site name: Houla—Gray Sandy Loam 20-25" PZ; Salco—Gray loamy upland 20-25" PZ; Lomart—Shallow Sandy Loam 20-30" PZ
Typical vegetation: Plains bristlegrass, hooded windmill grass, multiflower false Rhodes grass, pink pappusgrass, other perennial grasses, Arizona cottontop, other perennial forbs, lovegrass tridens, tanglehead, vine mesquite, other shrubs, buffalograss

Use and Management

Major land uses: The major land uses for this soil are livestock grazing and wildlife habitat. Some areas are used for forage production.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

7—Pernitas-Weesatche-Sarnosa

Setting

General location: Predominantly in the central and southeastern part of the county within the Central Rio Grande Plain
Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 245 to 800 feet

Composition

Percent of survey area: 8
Pernitas and similar soils: 37
Weesatche and similar soils: 26
Sarnosa and similar soils: 20
Contrasting soils: Coy, Clareville, and Verick

Soil Descriptions

Landscape: Inland, dissected coastal plains
Landform: Pernitas and Weesatche—Paleoterraces; Sarnosa—Interfluves
Parent material: Pernitas—Loamy alluvium in the Oakville sandstone and Fleming Formation of Miocene age or (to a lesser extent) in the Goliad Formation of Miocene-Pliocene age; Weesatche—Loamy alluvium; Sarnosa—Loamy residuum weathered from sandstone

Typical Profiles

Pernitas

A—0 to 7 inches; moderately alkaline fine sandy loam
Bt—7 to 35 inches; moderately alkaline sandy clay loam
Btk—35 to 58 inches; moderately alkaline clay loam
Bk—58 to 80 inches; moderately alkaline sandy clay loam

Weesatche

A—0 to 11 inches; neutral fine sandy loam
Bt—11 to 30 inches; slightly alkaline sandy clay loam
Btk—30 to 44 inches; moderately alkaline sandy clay loam
Bk—44 to 80 inches; moderately alkaline sandy clay loam

Sarnosa

A—0 to 15 inches; moderately alkaline fine sandy loam
Bk1—15 to 30 inches; moderately alkaline fine sandy loam
Bk2—30 to 51 inches; moderately alkaline fine sandy loam
Bk—51 to 80 inches; moderately alkaline sandy clay loam

Properties and Qualities

Slope: Pernitas—1 to 5 percent; Weesatche—0 to 5 percent; Sarnosa—2 to 5 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: Moderate
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: Pernitas—About 9.4 inches (high); Weesatche—About 8.8 inches (moderate); Sarnosa—About 6.6 inches (moderate)

Natural drainage class: Well drained
Runoff: Pernitas and Weesatche—Very low; Sarnosa—Medium
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: Pernitas—2e; Weesatche—3e; Sarnosa—4e
Land capability nonirrigated: Pernitas—None specified; Weesatche—None specified; Sarnosa—None specified
Ecological site name: Pernitas—Gray sandy loam 20-25" PZ; Weesatche—Sandy loam 25-35" PZ; Sarnosa—Gray sandy loam 20-25" PZ
Typical vegetation: Hooded windmill grass, lovegrass tridens, other perennial grasses, pink pappusgrass, plains bristlegrass, tanglehead, multiflower false Rhodes grass, false Rhodes grass, Arizona cottontop, buffalograss, other shrubs, other perennial forbs, vine mesquite

Use and Management

Major land uses: The major land uses for this soil are livestock grazing and wildlife habitat. Some areas are used for food plots for wildlife enhancement.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

Very Deep, Loamy Soils on Paleoterraces and Stream Terraces

8—Caid-Leoncita-Brennan

Setting

General location: Predominantly in the western part of the county along the Frio River within the Western Rio Grande Plain
Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 295 to 895 feet

Composition

Percent of survey area: 10
Caid and similar soils: 42
Leoncita and similar soils: 31
Brennan and similar soils: 22
Contrasting soils: Imogene, Montell, and Brundage

Soil Descriptions

Landscape: Inland, dissected coastal plains
Landforms: Caid and Brennan—Terraces; Leoncita—Paleoterraces
Parent material: Caid and Brennan—Loamy alluvium; Leoncita—Calcareous loamy alluvium

Typical Profiles

Caid

A—0 to 10 inches; slightly alkaline sandy clay loam
Btk1—10 to 28 inches; slightly alkaline sandy clay loam
Btk2—28 to 80 inches; moderately alkaline clay loam

Leoncita

Ap—0 to 11 inches; moderately alkaline fine sandy loam
Bk1—11 to 41 inches; moderately alkaline sandy clay loam
Bk2—41 to 80 inches; moderately alkaline sandy clay loam

Brennan

A—0 to 7 inches; slightly alkaline fine sandy loam
Btk—7 to 37 inches; slightly alkaline sandy clay loam
Bkyz—37 to 80 inches; slightly alkaline sandy clay loam

Properties and Qualities

Slope: Caid—0 to 3 percent; Brennan—0 to 3 percent; Leoncita—1 to 3 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: Moderate
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: Caid—About 7.8 inches (moderate); Leoncita—About 9.0 inches (moderate); Brennan—About 8.9 inches (moderate)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: Caid—3e; Leoncita—3e; Brennan—3c
Land capability irrigated: Caid—2e; Leoncita—3e; Brennan—3c
Ecological site name: Caid—Gray Sandy Loam 18-25" PZ; Leoncita—Gray Sandy Loam 18-25" PZ; Brennan—Sandy loam 25-35" PZ
Typical vegetation: False Rhodes grass, buffalograss, curly-mesquite, other perennial grasses, pinhole bluestem, plains bristlegrass, plains lovegrass, Arizona cottontop, other shrubs, other perennial forbs, pink pappusgrass, sideoats grama

Use and Management

Major land uses: The major land uses for this soil are livestock grazing, forage production, and wildlife habitat.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

9—Brundage-Floresville-Colmena

Setting

General location: Predominantly in the northern and western part of the county within the Northern and Western Rio Grande Plain
Major land resource area: MLRA 83A—Northern Rio Grande Plain; 83B—Western Rio Grande Plain
Elevation: 200 to 495 feet

Composition

Percent of survey area: 3
Brundage and similar soils: 29
Floresville and similar soils: 27
Colmena and similar soils: 25
Contrasting soils: Coy, Laparita, and Leoncita

Soil Descriptions

Landscape: Inland, dissected coastal plains
Landform: Brundage—tread on stream terraces; Floresville—tread on stream terraces; Colmena—tread on stream terraces
Parent material: Brundage—Saline loamy alluvium; Floresville—Loamy alluvium over clayey residuum weathered from sandstone; Colmena—Loamy alluvium over calcareous loamy alluvium of quaternary age

Typical Profiles

Brundage

A—0 to 5 inches; slightly acid fine sandy loam
Btn—5 to 13 inches; neutral sandy clay loam
Btnz—13 to 47 inches; moderately alkaline sandy clay loam
BCknz—47 to 80 inches; moderately alkaline sandy clay loam

Floresville

A—0 to 11 inches; neutral fine sandy loam
Bt—11 to 31 inches; neutral clay
Btk—31 to 80 inches; moderately alkaline sandy clay loam

Colmena

Ap—0 to 9 inches; neutral fine sandy loam
Bt—9 to 29 inches; moderately alkaline sandy clay loam
Btk—29 to 40 inches; moderately alkaline sandy clay loam
Bk—40 to 80 inches; moderately alkaline sandy clay loam

Properties and Qualities

Slope: Brundage—0 to 2 percent; Floresville and Colmena—0 to 3 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: Brundage—Very slow; Floresville—Slow; Colmena—Moderate
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Brundage—Saline; Floresville and Colmena—Non-saline
Sodicity, representative within 40 inches: Brundage—Sodic; Floresville and Colmena—Not sodic
Sodicity, maximum within 40 inches: Brundage—Sodic; Floresville and Colmena—Not sodic
Representative total available water capacity to 60 inches: Brundage—About 5.3 inches (low); Floresville—About 8.4 inches (moderate); Colmena—About 9.3 inches (high)
Natural drainage class: Brundage—Moderately well drained; Floresville and Colmena—Well drained
Runoff: Brundage—Medium; Floresville and Colmena—Low
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: Brundage—6s; Floresville—4e; Colmena—2e
Land capability irrigated: Brundage—3e; Floresville—None specified; Colmena—None specified
Ecological site name: Brundage—Claypan prairie 18-25" PZ; Floresville—Tight sandy loam 20-25" PZ; Colmena—Sandy Loam 25-35" PZ
Typical vegetation: Plains bristlegrass, false Rhodes grass, Arizona cottontop, buffalograss, pinhole bluestem, pink pappusgrass, sideoats grama, vine mesquite, curly-mesquite, lovegrass tridens, other shrubs, Texas wintergrass, other perennial forbs, other annual forbs

Use and Management

Major land uses: The major land uses for this soil are livestock grazing, forage production, wildlife habitat, and food plots for wildlife enhancement.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

10—Chacon-Caid

Setting

General location: Predominantly in the central part of the county within the Western Rio Grande Plain
Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 175 to 470 feet

Composition

Percent of survey area: 2
Chacon and similar soils: 33
Caid and similar soils: 30
Contrasting soils: Leoncita, Montell, and Coy

Soil Descriptions

Landscape: Inland, dissected coastal plains
Landform: Terraces
Parent material: Chacon—Calcareous clayey alluvium over calcareous clayey residuum weathered from shale; Caid—Loamy alluvium

Typical Profiles

Chacon

A—0 to 11 inches; moderately alkaline sandy clay loam
Btk—11 to 44 inches; moderately alkaline clay
BCk—44 to 61 inches; moderately alkaline sandy clay loam

Caid

A—0 to 10 inches; slightly alkaline sandy clay loam
Btk1—10 to 28 inches; slightly alkaline sandy clay loam
Btk2—28 to 80 inches; moderately alkaline clay loam

Properties and Qualities

Slope: Chacon—0 to 2 percent; Caid—0 to 3 percent
Depth to first restrictive layer: No restrictive layer

Slowest soil permeability to 60 inches, above first cemented restrictive layer: Chacon—Very slow; Caid—Moderate
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: Chacon—About 9.2 inches (high); Caid—About 7.8 inches (moderate)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: Chacon—4c; Caid—3e
Land capability irrigated: Chacon—2s; Caid—2e
Ecological site name: Chacon—Clay Loam 18-25" PZ; Caid—Gray Sandy Loam 18-25" PZ
Ecological site number: Chacon—R083BY416TX; Caid—R083BY421TX
Typical vegetation: False Rhodes grass, Arizona cottontop, buffalograss, curly-mesquite, pinhole bluestem, plains bristlegrass, plains lovegrass, other shrubs, other perennial forbs, other perennial grasses, pink pappusgrass, sideoats grama

Use and Management

Major land uses: The major land uses for this soil are livestock grazing, forage production, and wildlife habitat.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

Very Deep, Clayey Soils on Flood Plains

11—Cochina-Coquat

Setting

General location: Predominantly in the western and central part of the county within the Nueces River and Frio River flood plains
Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 140 to 405 feet

Composition

Percent of survey area: 6
Cochina frequently flooded and similar soils: 76
Coquat frequently flooded and similar soils: 15
Contrasting soils: Buchel, Monwebb, and Tela

Soil Descriptions

Landscape: River valleys (fig. 6)
Landform: Flood plains
Parent material: Calcareous clayey alluvium

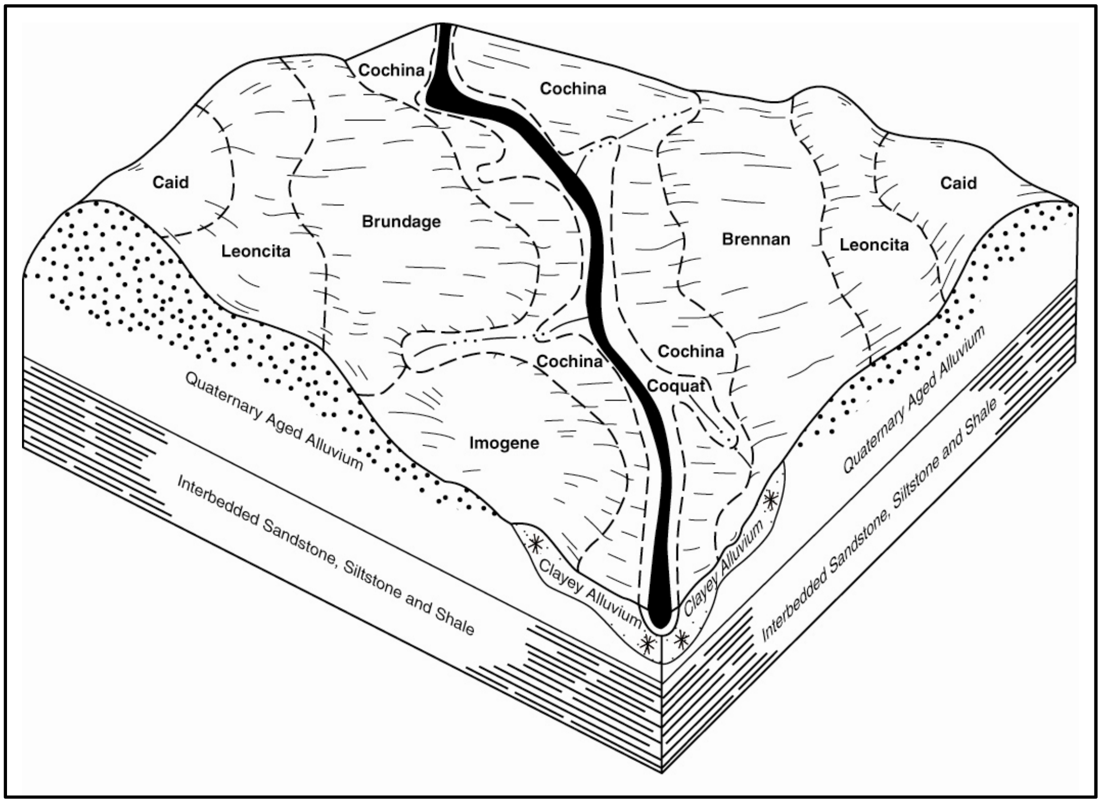
Cochina
Cochina
Caid
Caid
Brundage
Leoncita
Brennan
Leoncita
Cochina
Cochina
Coquat
Imogene
Quaternary Aged Alluvium
Quaternary Aged Alluvium
Interbedded Sandstone, Siltstone and Shale
Interbedded Sandstone, Siltstone and Shale
Clayey Alluvium
Clayey Alluvium

Figure 6.—Patterns and underlying material of the Cochina-Coquat and Caid-Leoncita-Brennan general soils map units.

Typical Profiles

Cochina

A—0 to 4 inches; moderately alkaline clay
Bss—4 to 33 inches; moderately alkaline clay
Bssz—33 to 80 inches; moderately alkaline clay

Coquat

A—0 to 5 inches; moderately alkaline clay
Bknss—5 to 36 inches; moderately alkaline clay
Bknssz—36 to 74 inches; moderately alkaline clay

Properties and Qualities

Slope: 0 to 1 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: Very slow
Salinity, representative within 40 inches: Cochina—saline; Coquat—Non-saline
Salinity, maximum within 40 inches: Saline
Sodicity, representative within 40 inches: Sodic
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: Cochina—About 6.6 inches (moderate); Coquat—About 5.5 inches (low)

Natural drainage class: Cochina—Moderately well drained; Coquat—Somewhat poorly drained
Runoff: Medium
Flooding frequency: Frequent
Ponding frequency: None
Depth to seasonal water table: Cochina—Not present within 80 inches; Coquat—Present within 80 inches

Interpretive Groups

Land capability nonirrigated: Cochina—4w; Coquat—6s
Land capability irrigated: Cochina—4w; Coquat—None specified
Ecological site name: Cochina—Clayey bottomland 18-35" PZ; Coquat—Lowland 22-35" PZ
Typical vegetation: Buffalograss, false Rhodes grass, other perennial grasses, pinhole bluestem, white tridens, other trees, alkali sacaton, other perennial forbs, pink pappusgrass, plains bristlegrass, sedge, southwestern bristlegrass, vine mesquite, Virginia wildrye, other shrubs

Use and Management

Major land uses: The major land uses for this soil are livestock grazing, forage production, and wildlife habitat. Some areas are planted in food plots to supplement wildlife.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

12—Cochina-Buchel

Setting

General location: Predominantly in the western and central part of the county within the Nueces River and Frio River flood plains
Major land resource area: MLRA 83B—Western Rio Grande Plain; MLRA 83C–Central Rio Grande Plain
Elevation: 140 to 405 feet

Composition

Percent of survey area: 4
Cochina frequently flooded and similar soils: 57
Buchel frequently flooded and similar soils: 28
Contrasting soils: Sinton, Coy, and Imogene

Soil Descriptions

Landscape: River valleys
Landforms: Flood plains
Parent material: Calcareous clayey alluvium

Typical Profiles

Cochina

A—0 to 4 inches; moderately alkaline clay
Bss—4 to 33 inches; moderately alkaline clay
Bssz—33 to 80 inches; moderately alkaline clay

Buchel

A—0 to 8 inches; moderately alkaline clay
Bss—8 to 53 inches; moderately alkaline clay
Bkssy—53 to 80 inches; moderately alkaline clay

Properties and Qualities

Slope: 0 to 1 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: Very slow
Salinity, representative within 40 inches: Cochina—Saline; Buchel—Non-saline
Salinity, maximum within 40 inches: Cochina—Saline; Buchel—Non-saline
Sodicity, representative within 40 inches: Cochina—Sodic; Buchel—Not sodic
Sodicity, maximum within 40 inches: Cochina—Sodic; Buchel—Not sodic
Representative total available water capacity to 60 inches: Cochina—About 6.6 inches (moderate); Buchel—About 9.6 inches (high)
Natural drainage class: Moderately well drained
Runoff: Cochina—Medium; Buchel—High
Flooding frequency: Frequent
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: Cochina—4w; Buchel—3w
Land capability irrigated: Cochina—4w; Buchel—None specified
Ecological site name: Cochina—Clayey bottomland 18-35" PZ; Buchel—Clayey bottomland 20-35" PZ
Typical vegetation: Buffalograss, false Rhodes grass, other perennial grasses, pinhole bluestem, white tridens, other trees, alkali sacaton, other perennial forbs, pink pappusgrass, plains bristlegrass, sedge, southwestern bristlegrass, vine mesquite, Virginia wildrye, other shrubs

Use and Management

Major land uses: The major land uses for this soil are livestock grazing, forage production, and wildlife habitat. Some areas are planted in food plots to supplement wildlife.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

Water

13—Water

Percent of survey area: 1

This area is the Choke Canyon Reservoir. Other areas included are ponds (stock tanks), lakes, or other water bodies.

Very Deep, Loamy Soils on Flood Plains

14—Zavala-Sinton

Setting

General location: Predominantly in the northern part of the county along the San Miguel Creek
Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 205 to 340 feet

Composition

Percent of survey area: 1
Zavala frequently flooded and similar soils: 57
Sinton and similar soils: 31
Contrasting soils: Imogene, Alet, and Clareville

Soil Descriptions

Landscape: River valleys
Landforms: Flood plains
Parent material: Loamy alluvium

Typical Profiles

Zavala

A—0 to 21 inches; neutral fine sandy loam
C—21 to 43 inches; slightly alkaline fine sandy loam

Sinton

A—0 to 9 inches; slightly alkaline sandy clay loam
Bw—9 to 52 inches; slightly alkaline sandy clay loam

Properties and Qualities

Slope: Zavala—0 to 1 percent; Sinton—0 to 2 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: Zavala—Moderately rapid; Sinton—Moderate
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: Zavala—About 6.1 inches (moderate); Sinton—About 7.7 inches (moderate)
Natural drainage class: Well drained
Runoff: Very low
Flooding frequency: Frequent
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: Zavala—3w; Sinton—3w
Ecological site name: Zavala—Loamy Bottomland 25-35" PZ; Sinton—Loamy bottomland 20-35" PZ
Typical vegetation: False Rhodes grass, little bluestem, big sandbur, other shrubs, vine mesquite, other perennial grasses, other trees, plains bristlegrass, sideoats grama, switchgrass, Texas wintergrass, Virginia wildrye, white tridens, other perennial forbs, other annual forbs

Use and Management

Major land uses: The major land uses of this soil are rangeland and wildlife habitat.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

Detailed Soil Map Units

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses.

Map unit delineations on a soil map represent an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to a taxonomic class other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The contrasting components are mentioned in the map unit descriptions. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and provides the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Brennan fine sandy loam, 0 to 3 percent slopes is a phase of the Brennan series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Cotulla-Maverick complex, 1 to 3 percent slopes, is an example.

This survey includes miscellaneous areas. Such areas have little or no soil material and support little or no vegetation. Pits, 1 to 5 percent slopes, is an example.

A complete soil description with range in characteristics is included, in alphabetical order, in the "Soil Series and Morphology" section. Composition is based on observations, descriptions, and transects of the map unit. Additional information specific to the components of this map unit is available in the Tables section. For more information about managing a map unit, see the section on "Soil Properties", and the section on "Use and Management" which includes subsections on "Crops and Pasture", "Engineering", "Rangeland", "Recreation", and "Wildlife Habitat".

Table 4 shows the acreage and proportionate extent of each map unit in this survey area. Other tables provide properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

AgB—Aguilares fine sandy loam, 0 to 3 percent slopes

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 185 to 595 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Aguilares and similar soils: 80 percent
Minor components: 20 percent

The composition of this map unit is based on cumulative field observations and descriptions from 3 transects with 56 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 60 to 90 percent Aguilares and similar soils and 10 to 40 percent minor components including Brennan, Brundage, and Leoncita soils.

- Brennan soils are on treads of terraces formed in loamy alluvium of Pleistocene age.
- Brundage soils are on stream terraces and flood-plain steps along drainageways formed from loamy alluvium of Pleistocene age.
- Leoncita soils are on paleoterraces formed from loamy alluvium of Pleistocene age.

Soil Description

Aguilares

Landscape: Inland, dissected coastal plains
Landforms: Interfluves
Geomorphic positions, two-dimensional: Summit, shoulder
Geomorphic positions, three-dimensional: Side slope
Down-slope shape: Linear

Across-slope shape: Convex
Parent material: Calcareous loamy residuum weathered from sandstone

Typical Profile

A—0 to 4 inches; moderately alkaline fine sandy loam
Bk—4 to 12 inches; moderately alkaline fine sandy loam
Bkz—12 to 39 inches; moderately alkaline sandy clay loam
Bknz—39 to 51 inches; neutral sandy clay loam
BCknz—51 to 80 inches; moderately alkaline sandy clay loam

Properties and Qualities

Slope: 0 to 3 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (moderate)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: About 5.3 inches (low)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 4e
Land capability irrigated: 2e
Ecological site name: Gray Loamy Upland 18-25" PZ
Ecological site number: R083BY420TX
Typical vegetation: False Rhodes grass, Arizona cottontop, other perennial grasses, pink pappusgrass, plains bristlegrass, buffalograss, hooded windmill grass, lovegrass tridens, other shrubs, other perennial forbs, slim tridens, threeawn

Use and Management

Major land uses: The major land uses for this soil are livestock grazing and wildlife habitat. Some areas are in forage production and crop production.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

AlB—Alet sandy clay loam, 0 to 2 percent slopes, flooded

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 300 to 700 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Alet frequently flooded and similar soils: 20 percent
Alet occasionally flooded and similar soils: 55 percent
Minor components: 25 percent

The composition of this map unit is based on cumulative field observations and descriptions from 2 transects and 33 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 55 to 95 percent Alet and similar soils and 5 to 45 percent minor components including Pernitas, Sarnosa, and Sinton soils.

- Pernitas soils are on summits, backslopes, and footslopes of paleoterraces and are formed in calcareous, loamy sediments of Pleistocene and Pliocene age.
- Sarnosa soils are on hill slopes and were formed in calcareous sandstone and loamy soil materials mainly of Miocene age and sandstone members of the Pliocene age.
- Sinton soils are on flood plains of rivers and streams and are formed in loamy alluvium of Quaternary age.

Soil Description

Alet soils, frequently flooded

Landscape: Inland, dissected coastal plains
Landforms: Drainageways
Down-slope shape: Linear
Across-slope shape: Linear, concave
Parent material: Loamy alluvium derived from sandstone

Typical Profile

A—0 to 4 inches; neutral sandy clay loam
Bt—4 to 49 inches; neutral and slightly alkaline sandy clay loam
Btk—49 to 80 inches; slightly alkaline sandy clay loam

Properties and Qualities

Slope: 0 to 1 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (moderate)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.5 inches (high)
Natural drainage class: Well drained
Runoff: Negligible
Flooding frequency: Frequent

Interpretive Groups

Land capability nonirrigated: 2e
Land capability irrigated: 1
Ecological site name: Loamy Bottomland 20-35" PZ
Ecological site number: R083CY462TX
Typical vegetation: Multiflower false Rhodes grass, Arizona cottontop, bristlegrass, plains lovegrass, other perennial forbs, Texas wintergrass, buffalograss, curly-mesquite, pink pappusgrass, sideoats grama, pinhole bluestem, other shrubs, honey mesquite

Alet soils, occasionally flooded

Landscape: Inland, dissected coastal plains
Landforms: Drainageways
Down-slope shape: Linear

Across-slope shape: Linear, concave
Parent material: Loamy alluvium derived from sandstone

Typical Profile

A—0 to 4 inches; neutral sandy clay loam
Bt—4 to 49 inches; neutral and slightly alkaline sandy clay loam
Btk—49 to 80 inches; slightly alkaline sandy clay loam

Properties and Qualities

Slope: 0 to 2 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (moderate)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.5 inches (high)
Natural drainage class: Well drained
Runoff: Negligible
Flooding frequency: Occasional

Interpretive Groups

Land capability nonirrigated: 2e
Land capability irrigated: 1
Ecological site name: Loamy Bottomland 20-35" PZ
Ecological site number: R083CY462TX
Typical vegetation: Multiflower false Rhodes grass, Arizona cottontop, bristlegrass, plains lovegrass, other perennial forbs, Texas wintergrass, buffalograss, curly-mesquite, pink pappusgrass, sideoats grama, pinhole bluestem, other shrubs, honey mesquite

Use and Management

Major land uses: The major land uses for this soil are livestock grazing and wildlife habitat. Some areas are in forage production and crop production.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

AnC—Annarose fine sandy loam, 2 to 5 percent slopes

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 240 to 625 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Annarose and similar soils: 75 percent
Minor components: 25 percent

The composition of this map unit is based on cumulative field observations and descriptions from 2 transects and 49 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 60 to 90 percent Annarose and similar soils and 8 to 25 percent minor components including Benavides, Pernitas, and Sarnosa soils.

- Benavides soils are on summits and shoulders of interfluves and are formed in calcareous loamy sediments of Pliocene age.
- Pernitas soils are on summits, backslopes, and footslopes of paleoterraces and are formed in calcareous, loamy sediments of Pleistocene and Pliocene age.
- Sarnosa soils are on hill slopes and were formed in calcareous sandstone and loamy soil materials mainly of Miocene age and sandstone members of the Pliocene age.

Soil Description

Annarose

Landscape: Inland, dissected coastal plains
Landforms: Interfluves
Geomorphic positions, two-dimensional: Summit, shoulder
Geomorphic positions, three-dimensional: Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy residuum weathered from calcareous sandstone

Typical Profile

A—0 to 6 inches; slightly alkaline fine sandy loam
Bk1—6 to 23 inches; slightly alkaline loam
Bk2—23 to 47 inches; slightly alkaline loam and fine sandy loam
Cdk—47 to 80 inches; sandstone bedrock

Properties and Qualities

Slope: 2 to 5 percent
Percent of area covered by surface fragments: Less than 1 percent angular channers
Depth to first restrictive layer: 40 to 60 inches to densic bedrock
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (moderate)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 6.5 inches (moderate)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: None specified
Ecological site name: Gray Sandy Loam 20-25" PZ
Ecological site number: R083CY456TX
Typical vegetation: Other perennial grasses, hooded windmill grass, lovegrass tridens, pink pappusgrass, plains bristlegrass, tanglehead, Arizona cottontop, buffalograss, false Rhodes grass, multiflower false Rhodes grass, other shrubs, other perennial forbs, vine mesquite

Use and Management

Major land uses: The major land uses for this soil are livestock grazing and wildlife habitat. Some areas are in forage production and crop production.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

ANS—Area not surveyed

The soil survey information in these areas is not available.

BeC—Benavides fine sandy loam, 2 to 5 percent slopes

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 300 to 800 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Benavides and similar soils: 90 percent
Minor components: 10 percent

The composition of this map unit is based on cumulative field observations and descriptions from 2 transects and 17 observations of the map unit. There is an estimated 90 percent probability that the composition of the map unit is 80 to 95 percent Benavides and similar soils and 5 to 20 percent minor components including Olmedo and Pernitas soils.

- Olmedo soils are on summits and shoulders on interfluves or ridges and are formed in calcareous, loamy residuum of Pliocene age.
- Pernitas soils are on summits, backslopes, and footslopes of paleoterraces and are formed in calcareous, loamy sediments of Pleistocene and Pliocene age.

Soil Description

Benavides

Landscape: Inland, dissected coastal plains
Landforms: Interfluves
Geomorphic positions, two-dimensional: Summit, shoulder
Geomorphic positions, three-dimensional: Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, concave
Parent material: Calcareous loamy residuum of the Goliad Formation

Typical Profile

A—0 to 9 inches; moderately alkaline fine sandy loam
Bk1—9 to 33 inches; moderately alkaline sandy clay loam
Bk2—33 to 45 inches; moderately alkaline clay loam
BCk—45 to 80 inches; moderately alkaline sandy clay loam

Properties and Qualities

Slope: 2 to 5 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (moderate)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 8.2 inches (moderate)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: None specified
Ecological site name: Gray Sandy Loam 20-25" PZ
Ecological site number: R083CY456TX
Typical vegetation: Plains bristlegrass, hooded windmill grass, multiflower false Rhodes grass, pink pappusgrass, other perennial grasses, Arizona cottontop, other perennial forbs, lovegrass tridens, tanglehead, vine mesquite, other shrubs, buffalograss

Use and Management

Major land uses: The major land uses of this soil are livestock grazing and wildlife habitat. Some areas are used for forage production.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

BkB—Bookout clay loam, 0 to 2 percent slopes

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 400 to 895 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 72 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Bookout and similar soils: 85 percent
Minor components: 15 percent

The composition of this map unit is based on cumulative field observations and descriptions from 2 transects and 20 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 85 percent Bookout and similar soils and 15 percent unnamed minor components.

- Unnamed minor components are found in concave low lying depressions formed in clayey alluvium of Holocene age.

Soil Description

Bookout

Landscape: Inland, dissected coastal plains
Landforms: Stream terraces
Geomorphic positions, three-dimensional: Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Calcareous loamy alluvium

Typical Profile

A—0 to 16 inches; moderately alkaline clay loam
Bk—16 to 80 inches; moderately alkaline clay

Properties and Qualities

Slope: 0 to 2 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (moderate)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.9 inches (high)
Natural drainage class: Well drained
Runoff: Negligible
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 3c
Land capability irrigated: 1
Ecological site name: Clay Loam 20-25" PZ
Ecological site number: R083AY382TX
Typical vegetation: Buffalograss, false Rhodes grass, pinhole bluestem, pink pappusgrass, plains bristlegrass, plains lovegrass, Arizona cottontop, curly-mesquite, other shrubs, other perennial forbs, other perennial grasses, Wright's threeawn

Use and Management

Major land uses: The major land uses of this soil are livestock grazing and wildlife habitat. Some areas are used for forage production.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

BnB—Brennan fine sandy loam, 0 to 3 percent slopes

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 190 to 390 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Brennan and similar soils: 70 percent
Minor components: 30 percent

The composition of this map unit is based on cumulative field observations and descriptions from 4 transects and 69 observations of the map unit.There is an estimated 80 percent probability that the composition of the map unit is 50 to 90 percent Brennan and similar soils and 10 to 50 percent minor components including Caid, Leoncita, Montell, and Salco soils.

- Caid soils are on stream terraces and are formed in loamy calcareous alluvium of Quaternary age.
- Leoncita soils are on risers and treads of remnant paleoterraces and are formed in calcareous, loamy alluvium of Pleistocene age.
- Montell soils are on the valley sides and valley floors and are formed in clayey alluvium of Quaternary age.
- Salco soils are on backslope and footslope positions on interfluves or high stream terraces and are formed in calcareous alluvium over residuum weathered from tuffaceous sandstone bedrock of Miocene age.

Soil Description

Brennan

Landscape: Inland, dissected coastal plains
Landforms: Terraces
Geomorphic positions, three-dimensional: Tread
Down-slope shape: Linear
Across-slope shape: Linear, convex
Parent material: Loamy alluvium

Typical Profile

A—0 to 7 inches; slightly alkaline fine sandy loam
Btk—7 to 37 inches; slightly alkaline sandy clay loam
Bkyz—37 to 80 inches; slightly alkaline sandy clay loam and sandy loam

Properties and Qualities

Slope: 0 to 3 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (moderate)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: About 8.9 inches (moderate)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 3c
Land capability irrigated: None specified
Ecological site name: Sandy Loam 25-35" PZ
Ecological site number: R083EY702TX

Typical vegetation: Multiflower false Rhodes grass, silver bluestem, pappusgrass, hooded windmill grass, Arizona cottontop, tanglehead, plains bristlegrass, other perennial forbs, other perennial grasses, other shrubs, other annual forbs, other trees

Use and Management

Major land uses: The major land uses for this soil are livestock grazing, forage production, and wildlife habitat. Some areas are planted in food plots to supplement wildlife.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

BrB—Brundage fine sandy loam, 0 to 2 percent slopes

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 165 to 455 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Brundage and similar soils: 80 percent
Minor components: 20 percent

The composition of this map unit is based on cumulative field observations and descriptions from 5 transects and 99 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 65 to 95 percent Brundage and similar soils and 5 to 35 percent minor components including Brennan, Copita, Leoncita, and Moglia soils.

- Brennan soils are on convex treads of terraces and are formed in loamy fluviatile deposits of Quaternary age.
- Copita soils are on interfluves and are formed in calcareous loamy residuum weathered from sandstone predominantly from the Oligocene and Eocene age.
- Leoncita soils are on risers and treads of remnant paleoterraces and are formed in calcareous, loamy alluvium of Pleistocene age.
- Moglia soils are on interfluves and are formed in calcareous, saline, loamy residuum weathered from mudstone underlain by Eocene bedrock.

Soil Description

Brundage

Landscape: Inland, dissected coastal plains
Landforms: Stream terraces
Geomorphic positions, three-dimensional: Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Saline loamy alluvium

Typical Profile

A—0 to 5 inches; slightly acid fine sandy loam
Btn—5 to 13 inches; neutral sandy clay loam

Btnz and Btknz—13 to 47 inches; moderately alkaline sandy clay loam
BCknz—47 to 80 inches; moderately alkaline clay loam

Properties and Qualities

Slope: 0 to 2 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (very slow)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Saline
Sodicity, representative within 40 inches: Sodic
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: About 5.3 inches (low)
Natural drainage class: Moderately well drained
Runoff: Medium
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 6s
Land capability irrigated: 3e
Ecological site name: Claypan Prairie 18-25" PZ
Ecological site number: R083BY417TX
Typical vegetation: Plains bristlegrass, false Rhodes grass, Arizona cottontop, buffalograss, pinhole bluestem, pink pappusgrass, sideoats grama, vine mesquite, curly-mesquite, lovegrass tridens, other shrubs, Texas wintergrass, other perennial forbs, other annual forbs

Use and Management

Major land uses: The major land uses for this soil are livestock grazing, forage production, and wildlife habitat.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

BsB—Brystal fine sandy loam, 0 to 3 percent slopes

Setting

Major land resource area: MLRA 83A—Northern Rio Grande Plain, and MLRA 83C—Western Rio Grande Plain
Elevation: 210 to 345 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Brystal and similar soils: 80 percent
Minor components: 20 percent

The composition of this map unit is based on cumulative field observations and descriptions from 3 transects and 45 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 65 to 85 percent Brystal and similar soils and 15 to 35 percent minor components including Caid, Imogene, Czar, and Webb soils.

- Caid soils are on stream terraces and are formed in loamy calcareous alluvium of Quaternary age.
- Imogene soils are on low stream terraces and are formed in saline, calcareous loamy sediments of Pleistocene or Holocene age.
- Czar soils are on stream terraces and are formed in loamy alluvial and eolian sediments of Holocene age over loamy alluvium of Quaternary age.
- Webb soils are on interfluves and are formed in loamy residuum from noncemented sandstone bedrock of Eocene age.

Soil Description

Brystal

Landscape: Inland, dissected coastal plains
Landforms: Broad interfluves
Geomorphic positions, two-dimensional: Toeslope
Geomorphic positions, three-dimensional: Base slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Calcareous loamy residuum weathered from sandstone

Typical Profile

A—0 to 7 inches; neutral fine sandy loam
Bt—7 to 33 inches; neutral sandy clay loam
Btk—33 to 80 inches; slightly alkaline sandy clay loam

Properties and Qualities

Slope: 0 to 3 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (moderate)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 8.9 inches (moderate)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 2e
Ecological site name: Sandy Loam 18-25" PZ
Ecological site number: R083BY437TX
Typical vegetation: Arizona cottontop, false Rhodes grass, hooded windmill grass, pink pappusgrass, plains bristlegrass, silver bluestem, tanglehead, other shrubs, other perennial grasses, slim tridens, other perennial forbs, other annual forbs

Use and Management

Major land uses: The major land uses for this soil are livestock grazing, forage production, and wildlife habitat.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

BuA—Buchel clay, 0 to 1 percent slopes, occasionally flooded

Setting

Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 394 to 449 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Buchel occasionally flooded and similar soils: 85 percent
Minor components: 15 percent

The composition of this map unit is based on cumulative field observations and descriptions from 2 transects and 28 observations of the map unit. There is an estimated 85 percent probability that the composition of the map unit is 80 to 90 percent Buchel and similar soils and 10 to 20 percent minor components including Odem and Sinton soils.

- Odem soils are on natural levees along streams and rivers and are formed in loamy alluvial sediments of Holocene age.
- Sinton soils are on flood plains of rivers and streams and are formed in calcareous, loamy alluvium of Quaternary age.

Soil Description

Buchel soils, occasionally flooded

Landscape: River valleys
Landforms: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Calcareous clayey alluvium

Typical Profile

A—0 to 8 inches; moderately alkaline clay
Bss1—8 to 42 inches; moderately alkaline clay
Bss2—42 to 74 inches; moderately alkaline clay
BC—74 to 80 inches; moderately alkaline clay

Properties and Qualities

Slope: 0 to 1 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (very slow)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.6 inches (high)
Natural drainage class: Moderately well drained
Runoff: High
Flooding frequency: Occasional

Interpretive Groups

Land capability nonirrigated: 2w
Land capability irrigated: None specified
Ecological site name: Clayey Bottomland 20-35" PZ
Ecological site number: R083AY380TX
Typical vegetation: Buffalograss, false Rhodes grass, multiflower false Rhodes grass, vine mesquite, southwestern bristlegrass, big sandbur, Virginia wildrye, hairyseed paspalum, plains bristlegrass, other perennial forbs, other perennial grasses, other shrubs, other trees, giant sacaton, winged elm, other annual forbs

Use and Management

Major land uses: The major land uses of this soil are cropland and pastureland. Some areas are in wildlife habitat.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

BzA—Buchel clay, 0 to 1 percent slopes, frequently flooded

Setting

Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 130 to 345 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Buchel frequently flooded and similar soils: 95 percent
Minor components: 5 percent

The composition of this map unit is based on cumulative field observations and descriptions from 2 transects and 28 observations of the map unit. There is an estimated 95 percent probability that the composition of the map unit is 85 to 100 percent Buchel and similar soils and 0 to 15 percent minor components including Sinton and Odem soils.

- Sinton soils are on flood plains of rivers and streams and are formed in calcareous, loamy alluvium of Quaternary age.
- Odem soils are on natural levees along streams and rivers and are formed in loamy alluvial sediments of Holocene age.

Soil Description

Buchel soils, frequently flooded

Landscape: Inland, dissected coastal plains
Landforms: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Calcareous clayey alluvium

Typical Profile

A—0 to 8 inches; slightly alkaline clay
Bss1—8 to 22 inches; slightly alkaline clay
Bss2—22 to 53 inches; slightly alkaline clay
Bkss—53 to 80 inches; slightly alkaline clay

Properties and Qualities

Slope: 0 to 1 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (very slow)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.6 inches (high)
Natural drainage class: Moderately well drained
Runoff: High
Flooding frequency: Frequent

Interpretive Groups

Land capability nonirrigated: 3w
Land capability irrigated: None specified
Ecological site name: Clayey Bottomland 20-35" PZ
Ecological site number: R083AY380TX
Typical vegetation: False Rhodes grass, multiflower false Rhodes grass, buffalograss, vine mesquite, southwestern bristlegrass, big sandbur, other perennial forbs, Virginia wildrye, hairyseed paspalum, plains bristlegrass, other perennial grasses, other shrubs, other trees, giant sacaton, winged elm, other annual forbs

Use and Management

Major land uses: The major land uses of this soil are cropland and pastureland. Some areas are in wildlife habitat.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

CaB—Caid sandy clay loam, 0 to 3 percent slopes

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 295 to 895 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 72 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Caid and similar soils: 80 percent
Minor components: 20 percent

The composition of this map unit is based on cumulative field observations and descriptions from 2 transects with 42 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 65 to 90 percent Caid and similar soils, and 10 to 35 percent minor components including Brennan, Brystal, and Leoncita soils.

- Brennan soils are on convex treads of stream terraces of Quaternary age.
- Brystal soils are on toeslopes of broad interfluves underlain by Eocene age.
- Leoncita soils are on risers and treads of remnant paleoterraces of Pleistocene age.

Soil Description

Caid

Landscape: Inland, dissected coastal plains
Landforms: Terraces
Geomorphic positions, three-dimensional: Tread
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy alluvium

Typical Profile

A—0 to 10 inches; neutral sandy clay loam
Btk1—10 to 28 inches; slightly alkaline sandy clay loam
Btk2—28 to 80 inches; slightly alkaline and moderately alkaline clay loam

Properties and Qualities

Slope: 0 to 3 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (moderate)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 7.8 inches (moderate)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 2e
Ecological site name: Gray Sandy Loam 18-25" PZ
Ecological site number: R083BY421TX
Typical vegetation: False Rhodes grass, buffalograss, curly-mesquite, other perennial grasses, pinhole bluestem, plains bristlegrass, plains lovegrass, Arizona cottontop, other shrubs, other perennial forbs, pink pappusgrass, sideoats grama

Use and Management

Major land uses: The major land uses for this soil are livestock grazing, forage production, and wildlife habitat.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

CbB—Campbellton clay loam, 1 to 3 percent slopes

Setting

Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 195 to 440 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Campbellton and similar soils: 70 percent
Minor components: 30 percent

The composition of this map unit is based on cumulative field observations and descriptions from 6 transects with 97 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 60 to 85 percent Campbellton and similar soils, and 15 to 40 percent minor components including Esseville, Dosrios, Fashing, and Laparita soils.

- Esseville soils are on side slopes of interfluves underlain by clayey residuum derived from mudstone of Oligocene and Eocene age.
- Dosrios soils are on nose slopes of interfluves underlain by clayey residuum derived from mudstone of Oligocene and Eocene age.
- Fashing soils are on summits of ridges and interfluves derived from clayey materials over thick beds of interbedded claystone, mudstone, and sandstone bedrock of Oligocene and Eocene age.
- Laparita soils are on toeslopes and footslopes of interfluves developed from clayey and loamy slope alluvium over residuum of Eocene age.

Soil Description

Campbellton

Landscape: Inland, dissected coastal plains
Landforms: Interfluves
Geomorphic positions, two-dimensional: Summit, shoulder
Geomorphic positions, three-dimensional: Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy residuum weathered from shale

Typical Profile

A—0 to 5 inches; moderately alkaline clay loam
Bt—5 to 28 inches; moderately alkaline and slightly alkaline clay
Btkz—28 to 63 inches; slightly alkaline clay loam
Cdyz—63 to 80 inches; densic bedrock

Properties and Qualities

Slope: 1 to 3 percent
Depth to first restrictive layer: 60 to 78 inches to densic bedrock
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.2 to 0.6 in/hr (moderately slow)
Salinity, representative within 40 inches: Saline
Salinity, maximum within 40 inches: Saline
Sodicity, representative within 40 inches: Sodic
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: About 7.0 inches (moderate)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 2e
Land capability irrigated: 2e

Ecological site name: Saline Clay Loam 22-35" PZ
Ecological site number: R083AY402TX
Typical vegetation: Pink pappusgrass, other perennial grasses, pinhole bluestem, plains bristlegrass, plains lovegrass, multiflower false Rhodes grass, false Rhodes grass, Arizona cottontop, buffalograss, curly-mesquite, other shrubs, other perennial forbs, sideoats grama

Use and Management

Major land uses: The major land uses for this soil are livestock grazing, forage production, and wildlife habitat.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

CcB—Catarina clay, 0 to 2 percent slopes

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 295 to 800 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Catarina and similar soils: 90 percent
Minor components: 10 percent

The composition of this map unit is based on cumulative field observations and descriptions from 1 transect with 14 observations of the map unit. There is an estimated 90 percent probability that the composition of the map unit is 80 to 95 percent Catarina and similar soils, and 5 to 20 percent minor components including Aguilares, LaSalle, and Montell soils.

- Aguilares soils are on side slopes of interfluves and formed out of calcareous loamy sediments derived from sandstone of Oligocene and Eocene age.
- LaSalle soils are on valley floors and valley sides and are formed in clayey mudstone of Eocene age.
- Montell soils are on the valley sides and valley floors and are formed in clayey alluvium of Quaternary age.

Soil Description

Catarina

Landscape: Inland, dissected coastal plains
Landforms: Valley floors, valley sides
Geomorphic positions, two-dimensional: Backslope, toeslope
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Calcareous, saline clayey alluvium

Typical Profile

A—0 to 3 inches; moderately alkaline clay
Bknssyz—3 to 73 inches; moderately alkaline clay and slightly alkaline silty clay
Cknyz—73 to 80 inches; moderately alkaline clay

Properties and Qualities

Slope: 0 to 2 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (very slow)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Saline
Sodicity, representative within 40 inches: Sodic
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: About 4.4 inches (low)
Natural drainage class: Moderately well drained
Runoff: High
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 6s
Land capability irrigated: None specified
Ecological site name: Saline Clay 18-25" PZ
Ecological site number: R083BY432TX
Typical vegetation: Multiflower false Rhodes grass, alkali sacaton, bristlegrass, vine mesquite, whiplash pappusgrass, curly-mesquite, buffalograss, Arizona cottontop, tobosagrass, white tridens, other perennial forbs, other shrubs

Use and Management

Major land uses: The major land uses for this soil are livestock grazing and wildlife habitat.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

ChB—Chacon sandy clay loam, 0 to 2 percent slopes

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 175 to 470 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Chacon and similar soils: 80 percent
Minor components: 20 percent

The composition of this map unit is based on cumulative field observations and descriptions from 4 transects with 90 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 63 to 95 percent Chacon and similar soils, and 5 to 37 percent minor components including Caid, Coy, Laparita, and Leoncita soils.

- Caid soils are on stream and river terraces underlain by alluvium of Quaternary age.
- Coy soils are on terraces, broad flats, and hillslopes derived from alluvium of Quaternary age.
- Laparita soils are on toeslopes and footslopes of interfluves developed from clayey and loamy slope alluvium over residuum of Eocene age.

- Leoncita soils are on risers and treads of remnant paleoterraces of Pleistocene age.

Soil Description

Chacon

Landscape: Inland, dissected coastal plains
Landforms: Terraces
Geomorphic positions, three-dimensional: Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Calcareous clayey alluvium over calcareous clayey residuum weathered from shale

Typical Profile

Ap—0 to 11 inches; slightly alkaline sandy clay loam
Bt and Btk—11 to 44 inches; slightly alkaline clay and moderately alkaline clay loam
BCkyz—44 to 80 inches; moderately alkaline sandy clay loam

Properties and Qualities

Slope: 0 to 2 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (very slow)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.2 inches (high)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 4c
Land capability irrigated: 2s
Ecological site name: Clay Loam 18-25" PZ
Ecological site number: R083BY416TX
Typical vegetation: False Rhodes grass, Arizona cottontop, buffalograss, curly-mesquite, pinhole bluestem, plains bristlegrass, plains lovegrass, other shrubs, other perennial forbs, other perennial grasses, pink pappusgrass, sideoats grama

Use and Management

Major land uses: The major land uses for this soil are livestock grazing, forage production, and wildlife habitat.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

CkB—Choke silty clay loam, 1 to 3 percent slopes

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 200 to 400 feet
Mean annual precipitation: 22 to 26 inches

Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Choke and similar soils: 70 percent
Minor components: 30 percent

The composition of this map unit is based on cumulative field observations and descriptions from 3 transects with 30 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 65 to 80 percent Choke and similar soils, and 20 to 35 percent minor components including Condido, Eloso, and Rosenbrock soils.

- Condido soils are on interfluves underlain by weakly cemented siltstone of Miocene age.
- Eloso soils are on broad interfluves underlain by weakly cemented siltstone of Miocene age.
- Rosenbrock soils are on foot and toeslopes of interfluves underlain by weakly cemented siltstone of Miocene age.

Soil Description

Choke

Landscape: Inland, dissected coastal plains
Landforms: Knobs on interfluves, knobs on ridges
Geomorphic positions, two-dimensional: Summit
Geomorphic positions, three-dimensional: Base slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Clayey alluvium derived from metamorphic and sedimentary rock over weakly cemented residuum weathered from siltstone

Typical Profile

A—0 to 10 inches; moderately alkaline silty clay loam
Bw—10 to 24 inches; moderately alkaline silty clay loam
Bk—24 to 58 inches; moderately alkaline silty clay loam and silt loam
BCk—58 to 73 inches; moderately alkaline silt loam and loam
2Cd—73 to 80 inches; moderately alkaline siltstone bedrock that has silt loam texture

Properties and Qualities

Slope: 1 to 3 percent
Depth to first restrictive layer: 73 inches to densic bedrock
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (moderate)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 10.8 inches (high)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: None specified
Ecological site name: Gray Sandy Loam 18-25" PZ
Ecological site number: R083BY421TX
Typical vegetation: Other perennial grasses, hooded windmill grass, lovegrass tridens, pink pappusgrass, plains bristlegrass, tanglehead, Arizona cottontop, buffalograss, false Rhodes grass, multiflower false Rhodes grass, other shrubs, other perennial forbs, vine mesquite

Use and Management

Major land uses: The major land uses of this soil are rangeland and pastureland. Some areas are in wildlife habitat.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

ClA—Cochina clay, 0 to 1 percent slopes, occasionally flooded

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 140 to 405 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 72 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Cochina occasionally flooded and similar soils: 90 percent
Minor components: 10 percent

The composition of this map unit is based on cumulative field observations and descriptions from 5 transects with 85 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 70 to 100 percent Cochina and similar soils, and 0 to 30 percent minor components including Brennan and Coquat soils.

- Brennan soils are on convex treads of stream terraces of Quaternary age.
- Coquat soils are on flood plains of Quaternary age.

Soil Description

Cochina soils, occasionally flooded

Landscape: River valleys
Landforms: Flood-plain steps
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Calcareous clayey alluvium

Typical Profile

A—0 to 4 inches; slightly alkaline clay
Bnss—4 to 33 inches; moderately alkaline clay
Bnssz—33 to 80 inches; moderately alkaline clay

Properties and Qualities

Slope: 0 to 1 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (very slow)
Salinity, representative within 40 inches: Saline
Salinity, maximum within 40 inches: Saline
Sodicity, representative within 40 inches: Sodic
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: About 6.6 inches (moderate)
Natural drainage class: Moderately well drained
Runoff: Medium
Flooding frequency: Occasional

Interpretive Groups

Land capability nonirrigated: 3w (fig. 7)
Land capability irrigated: 3w
Ecological site name: Clayey Bottomland 18-35" PZ
Ecological site number: R083BY414TX
Typical vegetation: Buffalograss, false Rhodes grass, other perennial grasses, pinhole bluestem, white tridens, other trees, alkali sacaton, other perennial forbs, pink pappusgrass, plains bristlegrass, sedge, southwestern bristlegrass, vine mesquite, Virginia wildrye, other shrubs

Use and Management

Major land uses: The major land uses for this soil are livestock grazing, forage production, and wildlife habitat. Some areas are planted in sorghum, hay, and silage as supplement food for livestock.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

CmA—Cochina clay, 0 to 1 percent slopes, frequently flooded

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 140 to 405 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 72 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Cochina frequently flooded and similar soils: 90 percent
Minor components: 10 percent

The composition of this map unit is based on cumulative field observations and descriptions from 5 transects with 85 observations of the map unit. There is an estimated 90 percent probability that the composition of the map unit is 70 to 100 percent Cochina and similar soils, and 0 to 30 percent minor components including Brennan and Coquat soils.

- Brennan soils are on convex treads of stream terraces of Quaternary age.
- Coquat soils are on flood plains of Quaternary age.

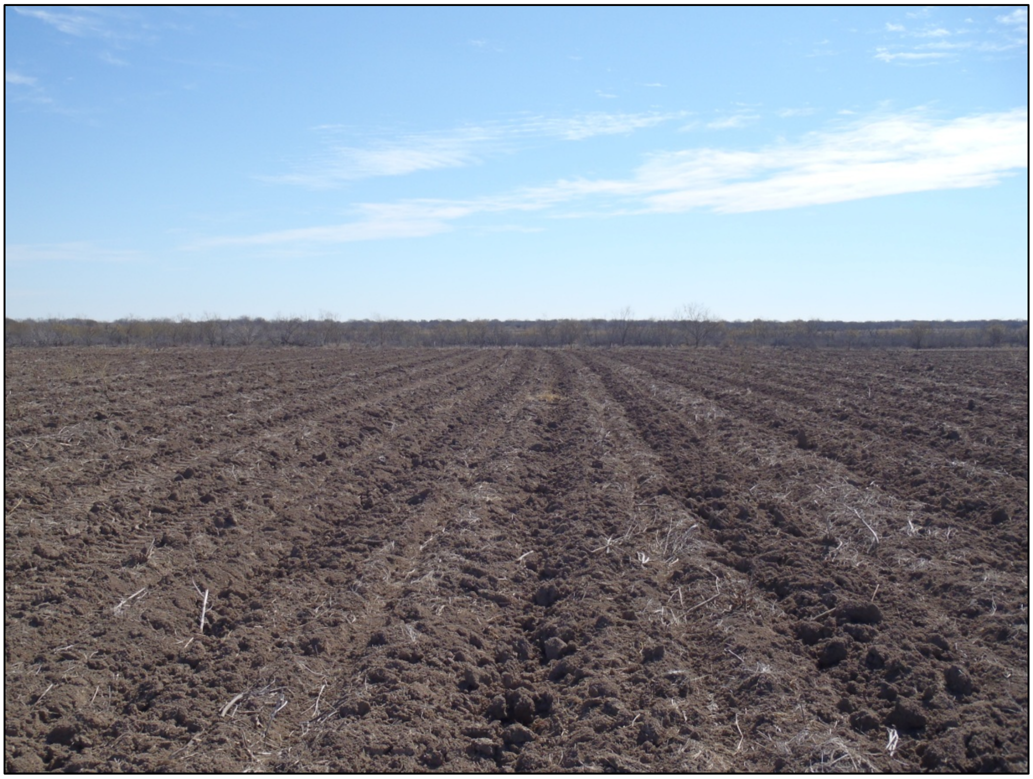

Figure 7.—Bedded area of Cochina clay, 0 to 1 percent slopes, occasionally flooded. Seed beds are prepared in case enough moisture is received to plant. This map unit is in Capability Class 3w.

Soil Description

Cochina soils, frequently flooded

Landscape: River valleys
Landforms: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Calcareous clayey alluvium

Typical Profile

A—0 to 4 inches; moderately alkaline clay
Bnss—4 to 33 inches; moderately alkaline clay
Bnssz—33 to 80 inches; moderately alkaline clay

Properties and Qualities

Slope: 0 to 1 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (very slow)
Salinity, representative within 40 inches: Saline
Salinity, maximum within 40 inches: Saline
Sodicity, representative within 40 inches: Sodic
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: About 6.6 inches (moderate)
Natural drainage class: Moderately well drained

Runoff: Medium
Flooding frequency: Frequent

Interpretive Groups

Land capability nonirrigated: 4w
Land capability irrigated: 4w
Ecological site name: Clayey Bottomland 18-35" PZ
Ecological site number: R083BY414TX
Typical vegetation: Buffalograss, false Rhodes grass, other perennial grasses, pinhole bluestem, white tridens, other trees, alkali sacaton, other perennial forbs, pink pappusgrass, plains bristlegrass, sedge, southwestern bristlegrass, vine mesquite, Virginia wildrye, other shrubs

Use and Management

Major land uses: The major land uses for this soil are livestock grazing, forage production, and wildlife habitat. Some areas are planted in food plots to supplement wildlife.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

CnB—Colmena fine sandy loam, 0 to 3 percent slopes

Setting

Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 245 to 750 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Colmena and similar soils: 82 percent
Minor components: 18 percent

The composition of this map unit is based on cumulative field observations and descriptions from 2 transects with 29 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 80 to 90 percent Colmena and similar soils, and 10 to 20 percent minor components including Brystal, Coy, and Czar soils.

- Brystal soils are on toeslopes of broad interfluves underlain by sandstone of Eocene Age.
- Coy soils are on terraces, broad flats, and hillslopes derived from alluvium of Quaternary age.
- Czar soils are on stream terraces of Quaternary age.

Soil Description

Colmena

Landscape: Inland, dissected coastal plains
Landforms: Paleoterraces remnants
Geomorphic positions, three-dimensional: Tread
Down-slope shape: Linear
Across-slope shape: Linear, convex
Parent material: Loamy alluvium over calcareous loamy alluvium of Quaternary age

Typical Profile

Ap—0 to 9 inches; slightly acid fine sandy loam
Bt—9 to 29 inches; neutral and moderately alkaline sandy clay loam
2Btk—29 to 40 inches; moderately alkaline sandy clay loam
2Bk—40 to 80 inches; moderately alkaline sandy clay loam and loam

Properties and Qualities

Slope: 0 to 3 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (moderate)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.3 inches (high)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 2e
Land capability irrigated: None specified
Ecological site name: Sandy Loam 25-35" PZ
Ecological site number: R083AY407TX
Typical vegetation: Multiflower false Rhodes grass, silver bluestem, pappusgrass, hooded windmill grass, Arizona cottontop, tanglehead, plains bristlegrass, other perennial forbs, other perennial grasses, other shrubs, other annual forbs, other trees

Use and Management

Major land uses: The major land uses for this soil are livestock grazing, forage production, wildlife habitat, and food plots for wildlife enhancement.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

CoB—Conquista clay, 1 to 3 percent slopes

Setting

Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 225 to 550 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Conquista and similar soils: 95 percent
Minor components: 5 percent

The composition of this map unit is based on cumulative field observations and descriptions from 1 transects with 10 observations of the map unit. There is an estimated 95 percent probability that the composition of the whole map unit is 80 to 90 percent Conquista and similar soils, and 10 to 20 percent unnamed minor components.

- Unnamed minor components are found in concave low lying depressions formed in clayey alluvium of Holocene age.

Soil Description

Conquista

Landscape: Inland, dissected coastal plains
Landforms: Reclaimed lands
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Mine spoil or earthy fill

Typical Profile

Ap—0 to 19 inches; slightly alkaline clay
2Ck—19 to 80 inches; moderately alkaline gravelly loam

Properties and Qualities

Slope: 1 to 3 percent
Percent of area covered by surface fragments: About 1 percent subangular channers, about 1 percent subangular channers
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (very slow)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 10.2 inches (high)
Natural drainage class: Well drained
Runoff: High
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 4e
Land capability irrigated: None specified
Ecological site name: Not assigned
Ecological site number: Not assigned

Use and Management

Major land uses: The use of this soil depends on if the site has been successfully reclaimed. In most areas, reclamation measures include grading and shaping, spreading topsoil, and establishing a permanent vegetation cover. If reclaimed, the major land uses for this soil are livestock grazing, forage production, wildlife habitat, and food plots for wildlife enhancement.
Wildlife habitat: In most areas, reclamation measures include grading and shaping, spreading topsoil, and establishing a permanent vegetation cover. This map unit when established with vegetation can provide habitat and forage for wildlife.

CpC—Copita sandy clay loam, 1 to 5 percent slopes

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 545 to 875 feet
Mean annual precipitation: 22 to 26 inches

Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Copita and similar soils: 80 percent
Minor components: 20 percent

The composition of this map unit is based on cumulative field observations and descriptions from 2 transects with 29 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 50 to 90 percent Copita and similar soils, and 10 to 50 percent minor components including Fashing, Maverick, and Whitsett soils.

- Fashing soils are on summits of ridges and interfluves derived from clayey materials over thick beds of interbedded claystones, mudstones, and sandstones of Oligocene and Eocene age.
- Maverick soils are on ridges and interfluves and are formed in calcareous, saline clayey residuum weathered from Cretaceous and Tertiary mudstone.
- Whitsett soils are on summits and shoulders on broad interfluves underlain by Oligocene age sandstones.

Soil Description

Copita

Landscape: Inland, dissected coastal plains
Landforms: Interfluves
Geomorphic positions, two-dimensional: Summit, shoulder
Geomorphic positions, three-dimensional: Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Residuum weathered from calcareous sandstone

Typical Profile

Ap and A—0 to 9 inches; moderately alkaline sandy clay loam
Bk—9 to 35 inches; moderately alkaline sandy clay loam
Crk—35 to 80 inches; paralithic bedrock

Properties and Qualities

Slope: 1 to 5 percent
Percent of area covered by surface fragments: Less than 1 percent subrounded gravel
Depth to first restrictive layer: 20 to 40 inches to paralithic bedrock
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 2.0 to 6.0 in/hr (moderately rapid)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 3.6 inches (low)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 6e
Land capability irrigated: None specified

Ecological site name: Gray Sandy Loam 18-25" PZ
Ecological site number: R083BY421TX
Typical vegetation: False Rhodes grass, hooded windmill grass, pink pappusgrass, plains bristlegrass, green sprangletop, lovegrass tridens, Arizona cottontop, plains lovegrass, buffalograss, other annual forbs, slim tridens, lime pricklyash, whitebrush, Texas pricklypear

Use and Management

Major land uses: The major land uses for this soil are livestock grazing and wildlife habitat.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

CtA—Coquat clay, 0 to 1 percent slopes, frequently flooded

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 225 to 495 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Coquat frequently flooded and similar soils: 85 percent
Minor components: 15 percent

The composition of this map unit is based on cumulative field observations and descriptions from 1 transect with 10 observations of the map unit. There is an estimated 85 percent probability that the composition of the map unit is 75 to 95 percent Coquat and similar soils, and 5 to 25 percent minor components including Bookout and Cochina soils.

- Bookout soils are on stream terraces and are formed in fine-silty alluvium of Pleistocene age.
- Cochina soils are on flood plains of rivers and streams and are formed in saline, clayey alluvium of Holocene age.

Soil Description

Coquat soils, frequently flooded

Landscape: River valleys
Landforms: Circular gilgai on flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Calcareous, sodic clayey alluvium

Typical Profile

A—0 to 5 inches; moderately alkaline clay
Bknss—5 to 36 inches; moderately alkaline clay
Bknssz and BCknz—36 to 80 inches; moderately alkaline clay

Properties and Qualities

Slope: 0 to 1 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (very slow)

Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Saline
Sodicity, representative within 40 inches: Sodic
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: About 5.5 inches (low)
Natural drainage class: Somewhat poorly drained
Runoff: Medium
Depth to seasonal water table: Present within 80 inches
Flooding frequency: Frequent

Interpretive Groups

Land capability nonirrigated: 6s
Land capability irrigated: None specified
Ecological site name: Lowland 22-35" PZ
Ecological site number: R083BY428TX
Typical vegetation: Gulf cordgrass, curly-mesquite, other perennial grasses, other perennial forbs

Use and Management

Major land uses: The major land uses for this soil are livestock grazing and wildlife habitat.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

CuB—Cotulla clay loam, 0 to 3 percent slopes

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 225 to 620 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Cotulla and similar soils: 70 percent
Minor components: 30 percent

The composition of this map unit is based on cumulative field observations and descriptions from 3 transects with 86 observations of the map unit. There is an estimated 70 percent probability that the composition of the map unit is 50 to 90 percent Cotulla and similar soils, and 10 to 50 percent minor components including Dosrios, Esseville, Maverick, and Montell soils.

- Dosrios soils are on nose slopes of interfluves underlain by clayey residuum derived from mudstone of Oligocene and Eocene age.
- Esseville soils are on side slopes of interfluves underlain by clayey residuum derived from mudstones of Oligocene and Eocene age.
- Maverick soils are on ridges and interfluves underlain by saline clayey residuum derived from mudstone of Eocene age.
- Montell soils are on the valley sides and valley floors and are formed in clayey alluvium of Quaternary age.

Soil Description

Cotulla

Landscape: Inland, dissected coastal plains
Landforms: Interfluves
Geomorphic positions, two-dimensional: Summit, shoulder
Geomorphic positions, three-dimensional: Side slope, nose slope, interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Calcareous, sodic clayey residuum weathered from shale

Typical Profile

A—0 to 4 inches; slightly alkaline clay loam
Bknss—4 to 32 inches; moderately alkaline clay
Bnssyz—32 to 60 inches; moderately alkaline clay
BCyz—60 to 71 inches; moderately alkaline clay
Cdyz—71 to 80 inches; moderately alkaline mudstone bedrock that has clay texture

Properties and Qualities

Slope: 0 to 3 percent
Depth to first restrictive layer: 57 to 64 inches to dense material
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (very slow)
Slowest permeability below the first cemented restrictive layer to 60 inches: 0.001 to 0.06 in/hr (very slow)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Saline
Sodicity, representative within 40 inches: Sodic
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: About 5.6 inches (low)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 4s
Land capability irrigated: 3s
Ecological site name: Saline Clay 18-25" PZ
Ecological site number: R083BY432TX
Typical vegetation: Vine mesquite, alkali sacaton, Texas bristlegrass, whiplash pappusgrass, curly-mesquite, multiflower false Rhodes grass, buffalograss, false Rhodes grass, Arizona cottontop, other shrubs, other perennial forbs, tobosagrass, white tridens

Use and Management

Major land uses: The major land uses for this soil are livestock grazing, forage production, and wildlife habitat.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

CVB—Cotulla-Maverick complex, 1 to 3 percent slopes

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 225 to 620 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Cotulla and similar soils: 70 percent
Maverick and similar soils: 20 percent
Minor components: 10 percent

The composition of this map unit is based on cumulative field observations and descriptions from 3 transects with 30 observations of the map unit. There is an estimated 90 percent probability that the composition of the map unit is 50 to 90 percent Cotulla and similar soils, 5 to 30 percent Maverick and similar soils, and 0 to 10 percent minor components including Dosrios, Esseville, Moglia, and Montell soils.

- Dosrios soils are on nose slopes of interfluves underlain by clayey residuum derived from mudstone of Oligocene and Eocene age.
- Esseville soils are on side slopes of interfluves underlain by clayey residuum derived from mudstones of Oligocene and Eocene age.
- Moglia soils are on side slopes of ridges and interfluves and formed from saline loamy sediments that are underlain by clayey residuum derived from mudstone of Eocene age.
- Montell soils are on the valley sides and valley floors and are formed in clayey alluvium of Quaternary age.

Soil Description

Cotulla

Landscape: Inland, dissected coastal plains
Landforms: Interfluves
Geomorphic positions, two-dimensional: Summit, shoulder
Geomorphic positions, three-dimensional: Side slope, nose slope, interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Calcareous, sodic clayey residuum weathered from shale

Typical Profile

A—0 to 4 inches; slightly alkaline clay loam
Bknss—4 to 32 inches; moderately alkaline clay
Bnssyz—32 to 60 inches; moderately alkaline clay
BCyz—60 to 71 inches; moderately alkaline clay
Cdyz—71 to 80 inches; moderately alkaline mudstone bedrock that has clay texture

Properties and Qualities

Slope: 1 to 3 percent
Depth to first restrictive layer: 57 to 64 inches to dense material
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (very slow)

Slowest permeability below the first cemented restrictive layer to 60 inches: 0.001 to 0.06 in/hr (very slow)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Saline
Sodicity, representative within 40 inches: Sodic
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: About 5.6 inches (low)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 4s
Land capability irrigated: 3s
Ecological site name: Saline Clay 18-25" PZ
Ecological site number: R083BY432TX
Typical vegetation: Vine mesquite, alkali sacaton, Texas bristlegrass, whiplash pappusgrass, curly-mesquite, multiflower false Rhodes grass, buffalograss, false Rhodes grass, Arizona cottontop, other shrubs, other perennial forbs, tobosagrass, white tridens

Maverick

Landscape: Inland, dissected coastal plains
Landforms: Ridges, interfluves
Geomorphic positions, two-dimensional: Summit, toeslope
Geomorphic positions, three-dimensional: Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Calcareous, saline, clayey residuum weathered from shale

Typical Profile

A and Bw—0 to 15 inches; moderately alkaline clay
Bknyz—15 to 33 inches; moderately alkaline clay
BCknyz—33 to 38 inches; moderately alkaline clay
Cdyz—38 to 80 inches; noncemented densic bedrock that has clay texture

Properties and Qualities

Slope: 1 to 3 percent
Depth to first restrictive layer: 24 to 43 inches to densic bedrock
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.06 to 0.2 in/hr (slow)
Salinity, representative within 40 inches: Saline
Salinity, maximum within 40 inches: Saline
Sodicity, representative within 40 inches: Sodic
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: About 5.6 inches (low)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 6e
Land capability irrigated: 4s
Ecological site name: Rolling Hardland 18-25" PZ

Ecological site number: R083BY431TX

Typical vegetation: Pink pappusgrass, buffalograss, false Rhodes grass, other perennial grasses, plains bristlegrass, alkali sacaton, Arizona cottontop, curly-mesquite, other shrubs, other perennial forbs, pinhole bluestem, tobosagrass

Use and Management

Major land uses: The major land uses of this soil are for livestock grazing, wildlife habitat, and forage production. Some areas are used for crop production. Some of the crops grown are grain sorghum.

Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

CyB—Coy clay loam, 1 to 3 percent slopes

Setting

Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 160 to 620 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Coy and similar soils: 90 percent
Minor components: 10 percent

The composition of this map unit is based on cumulative field observations and descriptions from 3 transects with 29 observations of the map unit. There is an estimated 90 percent probability that the composition of the map unit is 60 to 95 percent Coy and similar soils and 5 to 40 percent minor components including Chacon, Clareville, Pernitas, and Sinton soils.

- Chacon soils are on terraces and broad smooth plains and are formed in calcareous clays and loamy alluvium over residuum weathered from sandstone and shale of Eocene age.
- Clareville soils are on stream terraces along drainageways and are formed in clayey alluvium of Quaternary age.
- Pernitas soils are on shoulders, backslopes, and footslopes of paleoterraces of Pliocene or early Pleistocene age.
- Sinton soils are on flood plains of rivers and streams and are formed in calcareous, loamy alluvium of Quaternary age.

Soil Description

Coy

Landscape: Inland, dissected coastal plains
Landforms: Terraces
Geomorphic positions, two-dimensional: Footslope
Geomorphic positions, three-dimensional: Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Calcareous clayey alluvium derived from shale

Typical Profile

A—0 to 8 inches; moderately alkaline clay loam

Bt and Btk—8 to 48 inches; moderately alkaline clay
Bk—48 to 80 inches; moderately alkaline clay loam

Properties and Qualities

Slope: 1 to 3 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (very slow)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: About 9.5 inches (high)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 2e
Land capability irrigated: 2e
Ecological site name: Clay Loam 20-25" PZ
Ecological site number: R083CY446TX
Typical vegetation: Pinhole bluestem, plains lovegrass, sideoats grama, Texas cupgrass, buffalograss, plains bristlegrass, vine mesquite, curly-mesquite, false Rhodes grass, Texas wintergrass, annual grasses, other perennial forbs, other perennial grasses

Use and Management

Major land uses: The major land uses of this soil are for livestock grazing, wildlife habitat, and forage production. Some areas are used for crop production. Some of the crops grown are grain sorghum.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

CZB—Czar-Clareville complex, 0 to 2 percent slopes, rarely flooded

Setting

Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 100 to 695 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Czar and similar soils: 60 percent
Clareville rarely flooded and similar soils: 30 percent
Minor components: 10 percent

The composition of this map unit is based on cumulative field observations and descriptions from 5 transects with 143 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 50 to 70 percent Czar and similar soils, 25 to 50 percent Clareville and similar soils, and 0 to 25 percent minor components including Sarnosa, Sinton, and unnamed hydric minor component.

- Sarnosa soils are on hillslopes underlain by sandstone of Miocene age.
- Sinton soils are on flood plains underlain by alluvium of Quaternary age.
- Unnamed minor components are found in concave low lying depressions formed in clayey alluvium of Holocene age.

Soil Description

Czar

Landscape: Inland, dissected coastal plains
Landforms: Drainageways
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Loamy alluvium of Quaternary age

Typical Profile

A—0 to 5 inches; slightly alkaline sandy clay loam
Bt—5 to 22 inches; moderately alkaline sandy clay loam
Btk—22 to 80 inches; moderately alkaline clay loam

Properties and Qualities

Slope: 0 to 1 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (moderate)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.2 inches (high)
Natural drainage class: Well drained
Runoff: Negligible
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 2c
Land capability irrigated: None specified
Ecological site name: Sandy Loam 25-35" PZ
Ecological site number: R083AY407TX
Typical vegetation: Bristlegrass, buffalograss, Arizona cottontop, plains lovegrass, curly-mesquite, pink pappusgrass, false Rhodes grass, multiflower false Rhodes grass, sideoats grama, pinhole bluestem, other perennial forbs, other shrubs, honey mesquite

Clareville soils, rarely flooded

Landforms: Draws, drainageways
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Loamy alluvium

Typical Profile

A—0 to 12 inches; slightly alkaline sandy clay loam
Bt—12 to 41 inches; slightly alkaline clay loam
Bk—41 to 80 inches; moderately alkaline sandy clay loam

Properties and Qualities

Slope: 1 to 2 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.2 to 0.6 in/hr (moderately slow)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 11.3 inches (high)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 2e
Land capability irrigated: None specified
Ecological site name: Clay Loam 25-35" PZ
Ecological site number: R083AY629TX
Typical vegetation: Bristlegrass, buffalograss, Arizona cottontop, plains lovegrass, curly-mesquite, pink pappusgrass, false Rhodes grass, multiflower false Rhodes grass, sideoats grama, pinhole bluestem, other perennial forbs, other shrubs, honey mesquite

Use and Management

Major land uses: The major land uses for this soil are crop production, forage production, livestock grazing, and wildlife habitat. Some of the area is planted in food plots for wildlife enhancement.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

DAM—Dams

This map unit is the earthen and concrete structure constructed to impound water on intermittent streams throughout the county.

DsB—Dosrios clay, 1 to 3 percent slopes

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 160 to 540 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Dosrios and similar soils: 80 percent
Minor components: 20 percent

The composition of this map unit is based on cumulative field observations and descriptions from 5 transects with 172 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 50 to 95 percent

Dosrios and similar soils and 5 to 50 percent minor components including Campbellton, Esseville, Fashing, and Hindes soils.

- Campbellton soils are on side slopes and shoulders of interfluves and are derived from sandstone and claystone of Oligocene age.
- Esseville soils are on side slopes of interfluves underlain by clayey residuum derived from mudstones of Oligocene and Eocene age.
- Fashing soils are on summits of ridges and interfluves derived from clayey materials over thick beds of interbedded claystones, mudstones, and sandstones of Oligocene and Eocene age.
- Hindes soils are on paleoterraces and are formed in the Uvalde Gravel of Pliocene or Pleistocene age.

Soil Description

Dosrios

Landscape: Inland, dissected coastal plains
Landforms: Broad interfluves
Geomorphic positions, two-dimensional: Shoulder, backslope
Geomorphic positions, three-dimensional: Nose slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Moderately saline clayey fluviomarine deposits over clayey residuum weathered from mudstone

Typical Profile

A—0 to 8 inches; slightly alkaline clay
Bss—8 to 30 inches; slightly alkaline clay
Bkyz—30 to 54 inches; slightly alkaline clay
2BCkyz—54 to 70 inches: moderately alkaline clay
2Cdyz—70 to 80 inches; moderately alkaline mudstone bedrock that has clay texture

Properties and Qualities

Slope: 1 to 3 percent
Percent of area covered by surface fragments: Less than 1 percent subrounded gravel
Depth to first restrictive layer: 60 to 78 inches to dense material
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (very slow)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Saline
Sodicity, representative within 40 inches: Sodic
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: About 9.3 inches (high)
Natural drainage class: Moderately well drained
Runoff: Medium
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 3s
Land capability irrigated: 3e
Ecological site name: Saline Clay 18-25" PZ
Ecological site number: R083BY432TX
Typical vegetation: Other perennial grasses, pinhole bluestem, plains lovegrass, sideoats grama, Texas cupgrass, vine mesquite, buffalograss, plains bristlegrass, curly-mesquite, Texas wintergrass, false Rhodes grass, other perennial forbs, other annual forbs

Use and Management

Major land uses: The major land uses for this soil are livestock grazing, forage production, and wildlife habitat.

Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

EsB—Eloso clay, 0 to 3 percent slopes

Setting

Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 350 to 550 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Eloso and similar soils: 70 percent
Minor components: 30 percent

The composition of this map unit is based on cumulative field observations and descriptions from 3 transects with 35 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 60 to 80 percent Eloso and similar soils and 20 to 40 percent minor components including Choke, Condido, Pavelek, and Rosenbrock soils.

- Choke soils are on erosion remnants and are formed in calcareous loamy residuum over tuffaceous sediments of Tertiary age.
- Condido soils are on interfluves underlain by weakly cemented siltstone of Miocene age.
- Pavelek soils are on ridges and are formed in clayey sediments over noncalcareous weakly cemented siltstone bedrock interbedded with layers of soft calcium carbonate of Miocene age.
- Rosenbrock soils are on foot and toeslopes of interfluves underlain by weakly cemented siltstone of Miocene age.

Soil Description

Eloso

Landscape: Inland, dissected coastal plains
Landforms: Broad interfluves
Geomorphic positions, two-dimensional: Summit, shoulder, backslope
Geomorphic positions, three-dimensional: Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Clayey alluvium over weakly cemented siltstone

Typical Profile

A—0 to 9 inches; neutral clay
Bw—9 to 17 inches; neutral clay
Bk—17 to 37 inches; slightly alkaline clay and clay loam
2Crk—37 to 80 inches; moderately alkaline siltstone bedrock

Properties and Qualities

Slope: 0 to 3 percent
Depth to first restrictive layer: 37 inches to paralithic bedrock
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (very slow)
Slowest permeability below the first cemented restrictive layer to 60 inches: 0.6 to 2.0 in/hr (moderate)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.3 inches (high)
Natural drainage class: Well drained
Runoff: Very high
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: None specified
Ecological site name: Rolling Blackland 25-35" PZ
Ecological site number: R083AY399TX
Typical vegetation: Arizona cottontop, sideoats grama, Texas cupgrass, buffalograss, vine mesquite, awnless bushsunflower, silver bluestem, Texas wintergrass, annual grasses, false Rhodes grass, multiflower false Rhodes grass, other perennial forbs, other perennial grasses, plains bristlegrass, southwestern bristlegrass

Use and Management

Major land uses: The major land uses of this soil are rangeland and pastureland. Some areas are in cropland.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

EvC—Esseville clay, 1 to 5 percent slopes

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 180 to 500 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Esseville and similar soils: 75 percent
Minor components: 25 percent

The composition of this map unit is based on cumulative field observations and descriptions from 3 transects with 54 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 40 to 90 percent Esseville and similar soils and 10 to 60 percent minor components including Campbellton, Dosrios, Fashing, Laparita, and Tordia soils.

- Campbellton soils are on side slopes and shoulders of interfluves and are underlain by sandstone of Oligocene age.

- Dosrios soils are on nose slopes of interfluves underlain by clayey residuum derived from mudstone of Oligocene and Eocene age.
- Fashing soils are on summits of ridges and interfluves derived from clayey materials over thick beds of interbedded claystone, mudstone, and sandstone bedrock of the Oligocene and Eocene age.
- Laparita soils are on toeslopes and footslopes of interfluves developed from clayey and loamy slope alluvium over residuum of Oligocene age.
- Tordia soils are on side slopes, shoulders, and summits of broad interfluves and are formed in clayey material over materials weathered from mudstone of Oligocene and Eocene age.

Soil Description

Esseville

Landscape: Inland, dissected coastal plains
Landforms: Interfluves
Geomorphic positions, two-dimensional: Summit, shoulder, backslope
Geomorphic positions, three-dimensional: Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Saline clayey fluviomarine deposits over saline clayey marine deposits derived from mudstone

Typical Profile

A—0 to 10 inches; slightly alkaline clay
Bss—10 to 24 inches; slightly alkaline clay
Bkssyz and 2BCkssyz—24 to 34 inches; slightly alkaline clay
2Cdyz—34 to 80 inches; slightly alkaline mudstone bedrock that has gypsiferous clay texture

Properties and Qualities

Slope: 1 to 5 percent
Percent of area covered by surface fragments: Less than 1 percent subrounded gravel
Depth to first restrictive layer: 34 inches to densic bedrock
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (very slow)
Slowest permeability below the first cemented restrictive layer to 60 inches: 0.001 to 0.06 in/hr (very slow)
Salinity, representative within 40 inches: Saline
Salinity, maximum within 40 inches: Saline
Sodicity, representative within 40 inches: Sodic
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: About 7.0 inches (moderate)
Natural drainage class: Well drained
Runoff: Very high
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 2e
Land capability irrigated: None specified
Ecological site name: Saline Clay 18-25" PZ
Ecological site number: R083BY432TX

Typical vegetation: Vine mesquite, alkali sacaton, tobosagrass, whiplash pappusgrass, curly-mesquite, multiflower false Rhodes grass, false Rhodes grass, buffalograss, Arizona cottontop, other shrubs, other perennial forbs, white tridens

Use and Management

Major land uses: The major land uses for this soil are livestock grazing, forage production, and wildlife habitat.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

FaC—Fashing clay, 1 to 5 percent slopes

Setting

Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 210 to 465 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Fashing and similar soils: 90 percent
Minor components: 10 percent

The composition of this map unit is based on cumulative field observations and descriptions from 5 transects with 103 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 86 to 95 percent Fashing and similar soils and 5 to 14 percent minor components including Campbellton, Dosrios, and Esseville soils.

- Campbellton soils are on side slopes and shoulders of interfluves and are derived from sandstone of Oligocene age.
- Dosrios soils are on nose slopes of interfluves underlain by clayey residuum derived from mudstone of Oligocene and Eocene age.
- Esseville soils are on side slopes of interfluves underlain by clayey residuum derived from mudstones of Oligocene and Eocene age.

Soil Description

Fashing

Landscape: Inland, dissected coastal plains
Landforms: Ridges, interfluves
Geomorphic positions, two-dimensional: Summit, shoulder
Geomorphic positions, three-dimensional: Nose slope, interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Clayey alluvium over siltstone

Typical Profile

A1—0 to 7 inches; moderately alkaline clay
A2—7 to 12 inches; moderately alkaline clay
2Cdyz—12 to 80 inches; moderately alkaline mudstone bedrock that has clay texture

Properties and Qualities

Slope: 1 to 5 percent
Depth to first restrictive layer: 10 to 20 inches to densic bedrock
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.06 to 0.2 in/hr (slow)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 1.5 inches (very low)
Natural drainage class: Well drained
Runoff: High
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 4e
Land capability irrigated: 3e
Ecological site name: Shallow 25-35" PZ
Ecological site number: R083AY408TX
Typical vegetation: Sideoats grama, Arizona cottontop, other perennial forbs, pinhole bluestem, Texas wintergrass, annual grasses, awnless bushsunflower, buffalograss, curly-mesquite, hooded windmill grass, other shrubs, plains lovegrass, vine mesquite

Use and Management

Major land uses: The major land uses for this soil are livestock grazing, forage production, and wildlife habitat.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

FoB—Floresville fine sandy loam, 0 to 3 percent slopes

Setting

Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 200 to 495 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Floresville eroded and similar soils: 75 percent
Minor components: 25 percent

The composition of this map unit is based on cumulative field observations and descriptions from 1 transect with 20 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 60 to 80 percent Floresville and similar soils and 20 to 40 percent minor components including Brundage, Brystal, and Zavalla soils.

- Brundage soils are on stream terraces and flood-plain steps along drainageways and are formed in saline, loamy alluvium of Quaternary age.
- Brystal soils are on toeslopes of broad interfluves underlain by sandstone of Eocene age.

- Zavala soils are on flood plains in drainageways and are formed in loamy alluvium of Quaternary age.

Soil Description

Floresville soils, eroded

Landscape: Inland, dissected coastal plains
Landforms: Stream terraces
Geomorphic positions, three-dimensional: Tread
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy alluvium over clayey residuum weathered from sandstone

Typical Profile

A—0 to 5 inches; neutral fine sandy loam
BA—5 to 11 inches; neutral fine sandy loam
Bt—11 to 31 inches; neutral sandy clay
Btk and BCk—31 to 80 inches; moderately alkaline sandy clay loam

Properties and Qualities

Slope: 0 to 3 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.06 to 0.2 in/hr (slow)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 8.4 inches (moderate)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 4e
Land capability irrigated: None specified
Ecological site name: Tight Sandy Loam 20-25" PZ
Ecological site number: R083AY411TX
Typical vegetation: Little bluestem, brownseed paspalum, yellow Indiangrass, blackjack oak, other perennial forbs, post oak, purpletop tridens, sideoats grama, switchgrass, Texas wintergrass, yaupon

Use and Management

Major land uses: The major land uses for this soil are livestock grazing, forage production, and wildlife habitat. Some areas are planted in food plots for wildlife enhancement.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

HnC—Hindes very gravelly sandy clay loam, 1 to 5 percent slopes

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 155 to 505 feet

Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 72 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Hindes and similar soils: 85 percent
Minor components: 15 percent

The composition of this map unit is based on cumulative field observations and descriptions from 4 transects with 55 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 75 to 95 percent Hindes and similar soils and 5 to 25 percent minor components including Fashing and Maverick soils.

- Fashing soils are on summits of ridges and interfluves derived from clayey materials over thick beds of interbedded claystone, mudstone, and sandstone bedrock of the Oligocene and Eocene age.
- Maverick soils are on ridges and interfluves and are formed in calcareous, saline clayey residuum weathered from Cretaceous and Tertiary mudstone.

Soil Description

Hindes

Landscape: Inland, dissected coastal plains
Landforms: Paleoterraces
Geomorphic positions, two-dimensional: Summit, shoulder, backslope
Geomorphic positions, three-dimensional: Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Clayey and loamy gravelly alluvium

Typical Profile

A—0 to 4 inches; slightly acid very gravelly sandy clay loam
Bt—4 to 12 inches; neutral very gravelly clay
Btk—12 to 26 inches; slightly alkaline very gravelly clay loam
BCk—26 to 80 inches; moderately alkaline clay loam

Properties and Qualities

Slope: 1 to 5 percent
Percent of area covered by surface fragments: About 25 percent subrounded medium and coarse gravel
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.2 to 0.6 in/hr (moderately slow)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 3.9 inches (low)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 6s

Land capability irrigated: 6s
Ecological site name: Gravelly Ridge 20-35" PZ
Ecological site number: R083AY386TX
Typical vegetation: Other shrubs, Arizona cottontop, tanglehead, other perennial forbs, pinhole bluestem, sideoats grama, hooded windmill grass, green sprangletop, Texas bristlegrass, lovegrass tridens, slim tridens

Use and Management

Major land uses: The major land uses for this soil are livestock grazing and wildlife habitat.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

HoB—Houla clay loam, 1 to 3 percent slopes

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 300 to 700 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Houla and similar soils: 66 percent
Minor components: 34 percent

The composition of this map unit is based on cumulative field observations and descriptions from 8 transects with 156 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 55 to 90 percent Houla and similar soils and 10 to 45 percent minor components including Eloso, Lomart, Pavelek, Rosenbrock, Salco, and Tela soils.

- Eloso soils are on broad interfluves and are formed in clayey sediments over noncalcareous weakly consolidated siltstone interbedded with thin layers of calcium carbonate of Miocene age.
- Lomart soils are on summit positions on erosional remnants and are formed in loamy, tuffaceous residuum of Miocene age.
- Pavelek soils are on ridges and are formed in clayey sediments over noncalcareous weakly cemented siltstone bedrock interbedded with layers of soft calcium carbonate of Miocene age.
- Rosenbrock soils are on footslopes and toeslopes of interfluves and are formed over noncalcareous weakly cemented tuffaceous siltstone with loam or silt loam texture interbedded with thin layers of calcium carbonate of Miocene age.
- Salco soils are on backslope and footslope positions on interfluves or high stream terraces and are formed in loamy, calcareous alluvium and/or residuum from tuffaceous sandstone of Miocene age.
- Tela soils are on broad drainageways and are formed in loamy alluvium of Quaternary age.

Soil Description

Houla

Landscape: Inland, dissected coastal plains
Landforms: Erosion remnants
Geomorphic positions, two-dimensional: Backslope, footslope
Geomorphic positions, three-dimensional: Side slope, nose slope, interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum from calcareous, tuffaceous sandstone

Typical Profile

A—0 to 7 inches; moderately alkaline clay loam
Bk1—7 to 15 inches; moderately alkaline clay loam
Bk2 and BCk—15 to 58 inches; moderately alkaline silty clay loam
Ck—58 to 80 inches; moderately alkaline fine sandy loam

Properties and Qualities

Slope: 1 to 3 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (moderate)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 10.7 inches (high)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 3s
Land capability irrigated: None specified
Ecological site name: Gray Sandy Loam 20-25" PZ
Ecological site number: R083CY456TX
Typical vegetation: Plains bristlegrass, hooded windmill grass, multiflower false Rhodes grass, pink pappusgrass, other perennial grasses, Arizona cottontop, other perennial forbs, lovegrass tridens, tanglehead, vine mesquite, other shrubs, buffalograss

Use and Management

Major land uses: The major land uses for this soil are livestock grazing and wildlife habitat. Some areas are used for forage production.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

ImB—Imogene fine sandy loam, 0 to 2 percent slopes, occasionally flooded

Setting

Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 200 to 695 feet
Mean annual precipitation: 22 to 26 inches

Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Imogene occasionally flooded and similar soils: 80 percent
Minor components: 20 percent

The composition of this map unit is based on cumulative field observations and descriptions from 3 transects with 55 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 70 to 90 percent Imogene and similar soils and 10 to 30 percent minor components including Brundage, Laparita, and Monwebb soils.

- Brundage soils are on stream terraces and flood-plain steps along drainageways and are formed in saline, loamy alluvium of Quaternary age.
- Laparita soils are on toeslopes and footslopes of interfluves developed from clayey and loamy slope alluvium over residuum of Eocene age.
- Monwebb soils are on low stream terraces and are formed in saline, calcareous, loamy sediments of Pleistocene or Recent age.

Soil Description

Imogene soils, occasionally flooded

Landscape: Inland, dissected coastal plains
Landforms: Draws, low stream terraces
Geomorphic positions, three-dimensional: Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Saline, loamy alluvium

Typical Profile

A—0 to 4 inches; slightly acid fine sandy loam
Btn—4 to 13 inches; slightly alkaline sandy clay loam
Bknz—13 to 53 inches; moderately alkaline sandy clay loam
Bnz—53 to 80 inches; neutral sandy clay loam

Properties and Qualities

Slope: 0 to 2 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.06 to 0.2 in/hr (slow)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Saline
Sodicity, representative within 40 inches: Sodic
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: About 10.1 inches (high)
Natural drainage class: Moderately well drained
Runoff: Low
Flooding frequency: Occasional

Interpretive Groups

Land capability nonirrigated: 4s
Land capability irrigated: 3s
Ecological site name: Tight Sandy Loam 20-25" PZ

Ecological site number: R083AY411TX
Typical vegetation: Arizona cottontop, buffalograss, hooded windmill grass, pink pappusgrass, plains bristlegrass, sideoats grama, multiflower false Rhodes grass, tanglehead, false Rhodes grass, other perennial forbs, other perennial grasses, other shrubs

Use and Management

Major land uses: The major land uses for this soil are livestock grazing, forage production, and wildlife habitat.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

LaB—Laparita clay loam, 0 to 3 percent slopes, rarely flooded

Setting

Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 170 to 600 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Laparita rarely flooded and similar soils: 70 percent
Minor components: 30 percent

The composition of this map unit is based on cumulative field observations and descriptions from 3 transects with 55 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 70 to 90 percent Laparita and similar soils and 10 to 30 percent minor components including Brundage and Monwebb soils.

- Brundage soils are on stream terraces and flood-plain steps along drainageways and are formed in saline, loamy alluvium of Quaternary age.
- Monwebb soils are on low stream terraces and are formed in saline, calcareous, loamy sediments of Pleistocene or Recent age.

Soil Description

Laparita soils, rarely flooded

Landscape: Inland, dissected coastal plains
Landforms: Broad interfluves
Geomorphic positions, two-dimensional: Footslope
Geomorphic positions, three-dimensional: Base slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Clayey residuum weathered from shale

Typical Profile

A—0 to 4 inches; slightly alkaline clay loam
Bt and Btk—4 to 31 inches; moderately alkaline clay and clay loam
Bkyz and BCkyz—31 to 60 inches; moderately alkaline clay loam
2Ckyz—60 to 80 inches; moderately alkaline clay

Properties and Qualities

Slope: 0 to 3 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (very slow)
Salinity, representative within 40 inches: Saline
Salinity, maximum within 40 inches: Saline
Sodicity, representative within 40 inches: Sodic
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: About 9.1 inches (high)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: Rarely

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 3e
Ecological site name: Claypan Prairie 20-25" PZ
Ecological site number: R083AY383TX
Typical vegetation: Pink pappusgrass, southwestern bristlegrass, curly-mesquite, pinhole bluestem, plains bristlegrass, Arizona cottontop, buffalograss, hooded windmill grass, other perennial forbs, other perennial grasses, Texas wintergrass, vine mesquite, multiflower false Rhodes grass, false Rhodes grass

Use and Management

Major land uses: The major land uses of this soil are rangeland.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

LeB—Lasalle clay, 1 to 3 percent slopes

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 245 to 750 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Lasalle and similar soils: 80 percent
Minor components: 20 percent

The composition of this map unit is based on cumulative field observations and descriptions from 1 transect with 14 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 80 percent LaSalle and similar soils and 20 percent minor components including Cotulla, Maverick, Montell, and Moglia soils.

- Cotulla soils are on footslopes and side slopes of broad interfluves and are formed in calcareous, saline, clayey sediments interbedded with claystone and sandstone of Oligocene and Eocene age.
- Maverick soils are on ridges and interfluves and are formed in calcareous, saline clayey residuum weathered from Cretaceous and Tertiary mudstones.

- Montell soils are on the valley sides and valley floors and are formed in clayey alluvium of Quaternary age.
- Moglia soils are on side slopes of ridges and interfluves and formed from saline loamy sediments that are underlain by clayey residuum derived from mudstone of Eocene age.

Soil Description

Lasalle

Landscape: Inland, dissected coastal plains
Landforms: Interfluves
Geomorphic positions, two-dimensional: Backslope
Geomorphic positions, three-dimensional: Side slope, nose slope, interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Calcareous, sodic clayey alluvium derived from shale

Typical Profile

A—0 to 5 inches; moderately alkaline clay
ABnz—5 to 24 inches; moderately alkaline clay
Bnssyz and BCnssyz—24 to 80 inches; moderately alkaline clay

Properties and Qualities

Slope: 1 to 3 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (very slow)
Salinity, representative within 40 inches: Saline
Salinity, maximum within 40 inches: Saline
Sodicity, representative within 40 inches: Sodic
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: About 4.6 inches (low)
Natural drainage class: Moderately well drained
Runoff: High
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 4e
Land capability irrigated: 4e
Ecological site name: Saline Clay 18-25" PZ
Ecological site number: R083BY432TX
Typical vegetation: Alkali sacaton, false Rhodes grass, Texas bristlegrass, tobosagrass, vine mesquite, curly-mesquite, buffalograss, Arizona cottontop, other shrubs, other perennial forbs, whiplash pappusgrass, white tridens

Use and Management

Major land uses: The major land uses for this soil are livestock grazing, forage production, and wildlife habitat. Some ares are planted as food plots to enhance wildlife management.

Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

LnB—Leoncita fine sandy loam, 1 to 3 percent slopes

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 213 to 377 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Leoncita and similar soils: 85 percent
Minor components: 15 percent

The composition of this map unit is based on cumulative field observations and descriptions from 3 transects with 30 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 75 to 95 percent Leoncita and similar soils and 5 to 25 percent minor components including Caid, Colmena, and Tordia soils.

- Caid soils are on stream terraces and are formed in loamy calcareous alluvium of Quaternary age.
- Colmena soils are on paleoterraces remnants and are formed in loamy sediments over calcareous loamy alluvium of Quaternary age.
- Tordia soils are on side slopes, shoulders, and summits of broad interfluves and are formed in clayey sediments that are underlain by mudstone and sandstone of Oligocene and Eocene age.

Soil Description

Leoncita

Landscape: Inland, dissected coastal plains
Landforms: Paleoterraces
Geomorphic positions, three-dimensional: Riser, tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Calcareous loamy alluvium

Typical Profile

Ap—0 to 11 inches; slightly alkaline and moderately alkaline fine sandy loam
Bk1—11 to 41 inches; moderately alkaline sandy clay loam and loam
Bk2—41 to 80 inches; moderately alkaline sandy clay loam

Properties and Qualities

Slope: 1 to 3 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (moderate)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.0 inches (moderate)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 3e
Ecological site name: Gray Sandy Loam 18-25" PZ
Ecological site number: R083BY421TX
Typical vegetation: False Rhodes grass, hooded windmill grass, pink pappusgrass, plains bristlegrass, lovegrass tridens, green sprangletop, Arizona cottontop, buffalograss, lime pricklyash, other perennial forbs, plains lovegrass, slim tridens, whitebrush

Use and Management

Major land uses: The major land uses for this soil are livestock grazing, forage production, and wildlife habitat. Some areas are planted as food plots to enhance wildlife management.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

LoC—Lomart loam, 1 to 5 percent slopes

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 245 to 695 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Lomart and similar soils: 80 percent
Minor components: 20 percent

The composition of this map unit is based on cumulative field observations and descriptions from 3 transects with 59 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 70 to 90 percent Lomart and similar soils and 10 to 30 percent minor components including Annarose, Houla, Mirasol, and Salco soils.

- Annarose soils are on summits and shoulders of broad interfluves and ridges and are formed in calcareous sandy and loamy sediments underlain by sandstones of Miocene age.
- Houla soils are on broad flats and footslope positions on erosional remnants and are formed in loamy, calcareous, tuffaceous sediments of Miocene age.
- Mirasol soils are on cuestas and are formed from tuffaceous sandstone of Miocene age.
- Salco soils are on backslope and footslope positions on interfluves or high stream terraces and are formed in calcareous alluvium over residuum weathered from tuffaceous sandstone bedrock of Miocene age.

Soil Description

Lomart

Landscape: Inland, dissected coastal plains
Landforms: Erosion remnants
Geomorphic positions, two-dimensional: Summit, shoulder

Geomorphic positions, three-dimensional: Interfluve, crest
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Residuum from noncalcareous tuffaceous sandstone

Typical Profile

A—0 to 8 inches; moderately alkaline loam
Bk—8 to 24 inches; moderately alkaline loam
Cr—24 to 80 inches; weakly cemented tuffaceous sandstone bedrock

Properties and Qualities

Slope: 1 to 5 percent
Depth to first restrictive layer: 20 to 40 inches to paralithic bedrock
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (moderate)
Slowest permeability below the first cemented restrictive layer to 60 inches: 0.6 to 2.0 in/hr (moderate)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 3.1 inches (low)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 6e
Land capability irrigated: None specified
Ecological site name: Shallow Sandy Loam 20-30" PZ
Ecological site number: R083CY487TX
Typical vegetation: Sideoats grama, beardgrass, Nealley grama, plains bristlegrass, other perennial forbs, other perennial grasses, tanglehead, Wright's threeawn, Arizona cottontop, green sprangletop, other shrubs, other trees, multiflower false Rhodes grass, plains lovegrass, pink pappusgrass, other annual forbs

Use and Management

Major land uses: The major land uses for this soil are wildlife habitat and livestock grazing.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

MaD—Mata very gravelly sandy clay loam, 1 to 8 percent slopes

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 175 to 455 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Mata and similar soils: 91 percent

Minor components: 9 percent

The composition of this map unit is based on cumulative field observations and descriptions from 2 transects with 40 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 75 to 100 percent Mata and similar soils and 0 to 25 percent minor components including Esseville, Hindes, and Maverick soils.

- Esseville soils are on side slopes of interfluves underlain by clayey residuum derived from mudstones of Oligocene and Eocene age.
- Hindes soils are on paleoterraces and are formed in the Uvalde Gravel of Pliocene or Pleistocene age.
- Maverick soils are on ridges and interfluves and are formed in calcareous, saline clayey residuum weathered from Cretaceous and Tertiary mudstone.

Soil Description

Mata

Landscape: Inland, dissected coastal plains
Landforms: Interfluves, ridges
Geomorphic positions, two-dimensional: Summit, shoulder
Geomorphic positions, three-dimensional: Free face, crest, interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Gravelly loamy alluvium over shale

Typical Profile

A—0 to 14 inches; moderately alkaline very gravelly sandy clay loam
Bk—14 to 31 inches; moderately alkaline very gravelly sandy clay loam
Bkz—31 to 43 inches; moderately alkaline gravelly sandy clay loam
2Cdkyz—43 to 57 inches; moderately alkaline noncemented mudstone with clay loam texture
2Cdyz—57 to 80 inches; moderately alkaline noncemented mudstone with clay texture

Properties and Qualities

Slope: 1 to 8 percent
Percent of area covered by surface fragments: About 25 percent subrounded gravel, about 2 percent subrounded cobbles
Depth to first restrictive layer: 43 inches to densic bedrock
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.06 to 0.2 in/hr (slow)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 6.0 inches (moderate)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 4s
Land capability irrigated: None specified
Ecological site name: Gravelly Ridge 18-35" PZ
Ecological site number: R083BY419TX

Typical vegetation: Other shrubs, Arizona cottontop, tanglehead, other perennial forbs, green sprangletop, hooded windmill grass, lovegrass tridens, pinhole bluestem, sideoats grama, slim tridens, Texas bristlegrass

Use and Management

Major land uses: The major land uses of this soil are wildlife habitat and rangeland.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

McC—Maverick clay, 2 to 5 percent slopes

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 200 to 570 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Maverick and similar soils: 80 percent
Minor components: 20 percent

The composition of this map unit is based on cumulative field observations and descriptions from 5 transects with 98 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 50 to 90 percent Maverick and similar soils and 10 to 50 percent minor components including Campbellton and Moglia soils.

- Campbellton soils are on side slopes and shoulders of interfluves and are derived from sandstone and claystone like those of the Whitsett Formation of Oligocene age.
- Moglia soils are on side slopes of ridges and interfluves and formed from saline loamy sediments that are underlain by clayey residuum derived from mudstone of Eocene age.

Soil Description

Maverick

Landscape: Inland, dissected coastal plains
Landforms: Ridges, interfluves
Geomorphic positions, two-dimensional: Summit, toeslope
Geomorphic positions, three-dimensional: Crest, nose slope, interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Calcareous, saline, clayey residuum weathered from shale

Typical Profile

A and Bw—0 to 15 inches; moderately alkaline clay
Bknyz—15 to 33 inches; moderately alkaline clay
BCknyz—33 to 38 inches; moderately alkaline clay
Cdyz—38 to 80 inches; mudstone bedrock that has clay texture

Properties and Qualities

Slope: 2 to 5 percent
Depth to first restrictive layer: 24 to 43 inches to densic bedrock

Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.06 to 0.2 in/hr (slow)
Slowest permeability below the first cemented restrictive layer to 60 inches: 0.001 to 0.06 in/hr (very slow)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Saline
Sodicity, representative within 40 inches: Sodic
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: About 5.6 inches (low)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 6e
Land capability irrigated: 4s
Ecological site name: Rolling Hardland 18-25" PZ
Ecological site number: R083BY431TX
Typical vegetation: Pink pappusgrass, buffalograss, false Rhodes grass, other perennial grasses, plains bristlegrass, alkali sacaton, Arizona cottontop, curly-mesquite, other shrubs, other perennial forbs, pinhole bluestem, tobosagrass

Use and Management

Major land uses: The major land uses for this soil are livestock grazing and wildlife habitat.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

MgD—Mirasol gravelly sandy loam, 1 to 8 percent slopes

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 245 to 750
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Mirasol and similar soils: 85 percent
Minor components: 15 percent

The composition of this map unit is based on cumulative field observations and descriptions from 21 observations of the map unit. The map unit concept was used from the Soil Survey of Duval County, Texas. (USDA, 2010) There is an estimated 80 percent probability that the composition of the map unit 85 percent Mirasol and similar soils and 15 percent minor components including Houla, Lomart, Salco, and Tela soils.

- Houla soils are on broad flats and footslope positions on erosional remnants and are formed in loamy, calcareous, tuffaceous sediments of Miocene age.
- Lomart soils are on summit positions on erosional remnants and are formed in loamy, tuffaceous residuum in the Catahoula Formation of Miocene age.

- Salco soils are on backslope and footslope positions on interfluves or high stream terraces and are formed in calcareous alluvium over residuum weathered from tuffaceous sandstone bedrock of Miocene age.
- Tela soils are in drainageways formed from alluvium of Holocene age.

Soil Description

Mirasol

Landscape: Inland, dissected coastal plains
Landforms: Scarp slopes, cuestas
Geomorphic positions, two-dimensional: Summit, shoulder, backslope
Geomorphic positions, three-dimensional: Crest, interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy residuum weathered from tuff

Typical Profile

A—0 to 6 inches; moderately alkaline gravelly sandy loam
Bw—6 to 16 inches; moderately alkaline very gravelly sandy loam
Bkqm—16 to 19 inches; cemented material
Bqm—19 to 80 inches; cemented material

Properties and Qualities

Slope: 1 to 8 percent
Percent of area covered by surface fragments: About 25 percent subrounded
Depth to first restrictive layer: 8 to 19 inches to duripan
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (moderate)
Slowest permeability below the first cemented restrictive layer to 60 inches: 0.001 to 0.06 in/hr (very slow)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 1.6 inches (very low)
Natural drainage class: Well drained
Runoff: Very high
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 7s
Land capability irrigated: None specified
Ecological site name: Shallow Ridge 20-25" PZ
Ecological site number: R083CY485TX
Typical vegetation: Beardgrass, plains bristlegrass, hooded windmill grass, Arizona cottontop, tanglehead, fall witchgrass, slim tridens, pink pappusgrass, sand dropseed, other annual forbs, other perennial forbs, other perennial grasses, other shrubs, other trees

Use and Management

Major land uses: The major land uses for this soil are wildlife habitat and livestock grazing.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

MoC—Moglia sandy clay loam, 1 to 5 percent slopes

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 130 to 680 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Moglia and similar soils: 80 percent
Minor components: 20 percent

The composition of this map unit is based on cumulative field observations and descriptions from 3 transects with 65 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 75 to 85 percent Moglia and similar soils and 15 to 25 percent minor components including Brundage, Campbellton, and Cotulla soils.

- Brundage soils are on stream terraces and flood-plain steps along drainageways and are formed in saline, loamy alluvium of Quaternary age.
- Campbellton soils are on side slopes and shoulders of interfluves and are underlain by sandstone and claystone of Oligocene age.
- Cotulla soils are on footslopes and side slopes of broad interfluves and are formed in calcareous, saline, clayey sediments interbedded with claystone and sandstone of Oligocene and Eocene age.

Soil Description

Moglia

Landscape: Inland, dissected coastal plains
Landforms: Interfluves
Geomorphic positions, two-dimensional: Summit, shoulder
Geomorphic positions, three-dimensional: Nose slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Calcareous, saline loamy residuum over weathered shale

Typical Profile

A—0 to 6 inches; moderately alkaline sandy clay loam
Bkz—6 to 30inches; moderately alkaline clay loam
2Bknyz—30 to 60 inches; moderately alkaline loam

Properties and Qualities

Slope: 1 to 5 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.2 to 0.6 in/hr (moderately slow)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: About 5.9 inches (low)
Natural drainage class: Well drained

Runoff: Low
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 6e
Land capability irrigated: None specified
Ecological site name: Saline Clay Loam 18-35" PZ
Ecological site number: R083BY433TX
Typical vegetation: False Rhodes grass, other perennial grasses, Arizona cottontop, plains bristlegrass, curly-mesquite, pink pappusgrass, other shrubs, other perennial forbs

Use and Management

Major land uses: The major land uses for this soil are livestock grazing and wildlife habitat.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

MtB—Montell clay, 0 to 3 percent slopes

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 185 to 470 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 72 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Montell and similar soils: 80 percent
Minor components: 20 percent

The composition of this map unit is based on cumulative field observations and descriptions from 6 transects with 124 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 55 to 95 percent Montell and similar soils and 5 to 45 percent minor components including Campbellton, Cotulla, Dosrios, Esseville, and Monwebb soils.

- Campbellton soils are on side slopes and shoulders of interfluves and are derived from sandstone and claystone of Oligocene age.
- Cotulla soils are on footslopes and side slopes of broad interfluves and are formed in calcareous, saline, clayey sediments interbedded with claystone and sandstone of Oligocene and Eocene age.
- Dosrios soils are on nose slopes of interfluves underlain by clayey residuum derived from mudstone of Oligocene and Eocene age.
- Esseville soils are on side slopes of interfluves underlain by clayey residuum derived from mudstones of Oligocene and Eocene age.
- Monwebb soils are on low stream terraces and are formed in saline, calcareous, loamy sediments of Pleistocene or Recent age.

Soil Description

Montell

Landscape: Inland, dissected plains
Landforms: Circular gilgai on valley floors

Geomorphic positions, two-dimensional: Toeslope
Geomorphic positions, three-dimensional: Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey alluvium

Typical Profile

A—0 to 17 inches; moderately alkaline clay
Bnss—17 to 39 inches; moderately alkaline clay
Bkyz—39 to 80 inches; moderately alkaline clay

Properties and Qualities

Slope: 0 to 3 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (very slow)
Salinity, representative within 40 inches: Saline
Salinity, maximum within 40 inches: Saline
Sodicity, representative within 40 inches: Sodic
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: About 8.5 inches (moderate)
Natural drainage class: Moderately well drained
Runoff: High
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 6s
Land capability irrigated: 3e
Ecological site name: Clay Flat 18-25" PZ
Ecological site number: R083BY415TX
Typical vegetation: Pink pappusgrass, buffalograss, curly-mesquite, plains bristlegrass, whiplash pappusgrass, alkali sacaton, false Rhodes grass, other perennial forbs, other perennial grasses, sideoats grama, Texas wintergrass, tobosagrass, vine mesquite, white tridens

Use and Management

Major land uses: The major land uses for this soil are livestock grazing, forage production, and wildlife habitat.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

MwA—Monwebb clay, 0 to 1 percent slopes, occasionally flooded

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 175 to 485 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 72 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Monwebb occasionally flooded and similar soils: 80 percent

Minor components: 20 percent

The composition of this map unit is based on cumulative field observations and descriptions from 5 transects with 56 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 50 to 95 percent Monwebb and similar soils and 5 to 50 percent minor components including Brennan, Coquat, Maverick, and Montell soils.

- Brennan soils are on convex treads of terraces and are formed in loamy fluviatile deposits of Quaternary age.
- Coquat soils are on flood plains of streams and are formed in clayey alluvium of recent age.
- Maverick soils are on ridges and interfluves and are formed in calcareous, saline clayey residuum weathered from Cretaceous and Tertiary mudstone.
- Montell soils are on the valley sides and valley floors and are formed in clayey alluvium of Quaternary age.

Soil Description

Monwebb soils, occasionally flooded (fig. 8)

Landscape: Inland, dissected coastal plains
Landforms: Valley flats
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Clayey alluvium

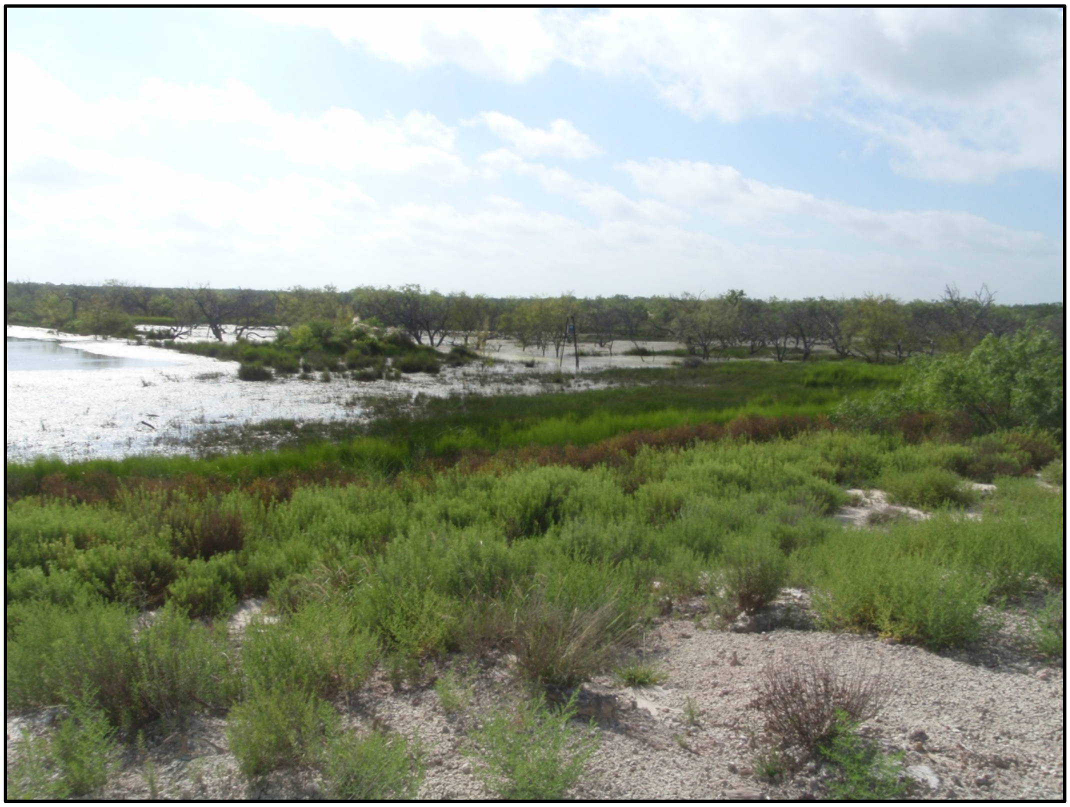

Figure 8.—Innudation is common on areas of Monwebb clay, 0 to 1 percent slopes, occasionally flooded. Flooding typically occurs during the spring, late summer, and fall months. In the foreground, is an area of Mata very gravelly sandy clay loam, 1 to 8 percent slopes.

Typical Profile

A—0 to 15 inches; moderately alkaline clay
Bnss—15 to 40 inches; moderately alkaline clay
Bnssz—40 to 80 inches; moderately alkaline clay

Properties and Qualities

Slope: 0 to 1 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (very slow)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Saline
Sodicity, representative within 40 inches: Sodic
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: About 9.1 inches (high)
Natural drainage class: Moderately well drained
Runoff: Very low
Flooding frequency: occasional

Interpretive Groups

Land capability nonirrigated: 4s
Land capability irrigated: None specified
Ecological site name: Clay Flat 18-25" PZ
Ecological site number: R083BY415TX
Typical vegetation: Pink pappusgrass, buffalograss, curly-mesquite, whiplash pappusgrass, other perennial forbs, other perennial grasses, plains bristlegrass, sideoats grama, Texas wintergrass, vine mesquite, tobosagrass, alkali sacaton, white tridens, multiflower false Rhodes grass, other annual forbs, other shrubs, other trees

Use and Management

Major land uses: The major land uses for this soil are wildlife habitat and livestock grazing.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

OmD—Olmedo very gravelly loam, 1 to 8 percent slopes

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 295 to 1,200 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Olmedo and similar soils: 90 percent
Minor components: 10 percent

The composition of this map unit is based on cumulative field observations and descriptions from 3 transect and 30 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 90 percent Olmedo and similar soils and 10 percent minor components including Benavides, Pernitas, and Sarnosa soils.

- Benavides soils are on summits and shoulders of interfluves and are formed in calcareous loamy sediments of Pliocene age.
- Pernitas soils are on summits, backslopes, and footslopes of paleoterraces and are formed in calcareous, loamy sediments of Pleistocene and Pliocene age.
- Sarnosa soils are on hill slopes and were formed in calcareous sandstone and loamy soil materials mainly of Miocene age and sandstone members of the Pliocene age.

Soil Description

Olmedo

Landscape: Inland, dissected coastal plains
Landforms: Interfluves
Geomorphic positions, two-dimensional: Summit, shoulder
Geomorphic positions, three-dimensional: Nose slope, interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Calcareous loamy residuum of Miocene Pliocene age

Typical Profile

A1—0 to 6 inches; moderately alkaline very gravelly loam
A2—6 to 12 inches; moderately alkaline extremely gravelly fine sandy loam
Bkkm1—12 to 38 inches; cemented material
BCk—30 to 80 inches; very gravelly cemented material

Properties and Qualities

Slope: 1 to 8 percent
Percent of area covered by surface fragments: About 13 percent subangular medium and coarse gravel, about 2 percent angular fine and medium channers
Depth to first restrictive layer: 10 to 20 inches to petrocalcic
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (moderate)
Slowest permeability below the first cemented restrictive layer to 60 inches: 0.001 to 0.06 in/hr (very slow)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 1.4 inches (very low)
Natural drainage class: Well drained
Runoff: High
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 7s
Land capability irrigated: None specified
Ecological site name: Shallow Ridge 20-25" PZ
Ecological site number: R083CY485TX
Typical vegetation: Sideoats grama, Arizona cottontop, other perennial forbs, other perennial grasses, plains bristlegrass, curly-mesquite, false Rhodes grass, little bluestem, multiflower false Rhodes grass, other shrubs, other trees, pinhole bluestem, sand dropseed, Texas grama

Use and Management

Major land uses: The major land uses for this soil are wildlife habitat and livestock grazing.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

PIT—Pits, 1 to 5 percent slopes

Setting

Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 185 to 875 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 71 to 74 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Pits and similar soils: 100 percent
Minor components: Hindes, Mata, Olmos

Composition is based on observations, descriptions, and or transects of the map unit.

Soil Description

Pits

Landscape: Inland, dissected coastal plains
Landforms: Ridges
Parent material: Caliche or gravel

Properties and Qualities

Slope: 0 to 5 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 6.0 to 20 in/hr (rapid)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 3.6 inches (low)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: Not assigned
Land capability irrigated: Not assigned
Ecological site name: Not assigned
Ecological site number: Not assigned

Use and Management

Major land uses: Commonly these areas support little or no vegetation. Unless they are reclaimed, they are not suited to use as rangeland or cropland or as habitat to wildlife or to most urban and recreation uses. In most areas, reclamation measures include grading and shaping, spreading topsoil, and establishing a permanent vegetation cover.

Wildlife habitat: In some cases Pits will hold water for periodic times of the year and provide water to livestock or wildlife.

PkC—Pavelek clay loam, 3 to 5 percent slopes, severely eroded

Setting

Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 350 to 475 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Pavelek severely eroded and similar soils: 70 percent
Minor components: 30 percent

The composition of this map unit is based on cumulative field observations and descriptions from 3 transects with 30 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 70 percent Pavelek and similar soils and 30 percent minor components including Choke and Sancajo soils.

- Choke soils are on erosion remnants and are formed in calcareous loamy residuum over tuffaceous sediments of Tertiary age.
- Sancajo soils are on interfluves and ridges over sediments of the Catahoula Formation of Miocene age.

Soil Description

Pavelek soils, severely eroded

Landscape: Inland, dissected coastal plains
Landforms: Narrow, low ridges
Geomorphic positions, two-dimensional: Shoulder
Geomorphic positions, three-dimensional: Nose slope, interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Clayey alluvium over weakly cemented siltstone

Typical Profile

A—0 to 4 inches; moderately alkaline clay loam
Bk—4 to 11 inches; moderately alkaline clay
Bkm—11 to 14 inches; moderately alkaline cemented material
BCk and 2Cr—14 to 80 inches; moderately alkaline siltstone that has silt loam texture

Properties and Qualities

Slope: 3 to 5 percent
Percent of area covered by surface fragments: About 4 percent subangular medium and coarse gravel, about 1 percent angular channers
Depth to first restrictive layer: 11 inches to petrocalcic
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.06 to 0.2 in/hr (slow)
Slowest permeability below the first cemented restrictive layer to 60 inches: 0.06 to 0.2 in/hr (slow)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline

Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 1.7 inches (very low)
Natural drainage class: Well drained
Runoff: High
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 6e
Land capability irrigated: None specified
Ecological site name: Shallow Ridge 20-32" PZ
Ecological site number: R083AY409TX
Typical vegetation: Sideoats grama, Arizona cottontop, other perennial forbs, other perennial grasses, plains bristlegrass, curly-mesquite, false Rhodes grass, little bluestem, multiflower false Rhodes grass, other shrubs, other trees, pinhole bluestem, sand dropseed, Texas grama

Use and Management

Major land uses: The major land uses of this soil are wildlife habitat and rangeland.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

PrC—Pernitas fine sandy loam, 1 to 5 percent slopes

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Landscape: Inland, dissected coastal plains
Elevation: 245 to 800 feet
Mean annual precipitation: 23 to 27 inches
Mean annual air temperature: 70 to 75 degrees F
Frost-free period: 275 to 295 days

Composition

Major components:
Pernitas and similar soils: 90 percent
Minor components: 10 percent

The composition of this map unit is based on cumulative field observations and descriptions from 5 transects with 50 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 60 to 95 percent Pernitas and similar soils and 5 to 40 percent minor components including Alet, Annarose, Benavides, Sarnosa, and Weesatche soils.

- Alet soils are on drainageways formed in alluvium of Holocene age.
- Annarose soils are on summits and shoulders of broad interfluves and ridges and are formed in calcareous sandy and loamy sediments underlain by sandstone of Miocene age.
- Benavides soils are on summits and shoulders of interfluves and are formed in calcareous loamy sediments of Pliocene age.
- Sarnosa soils are on hill slopes and were formed in calcareous sandstone and loamy soil materials of sandstone of Miocene age and Pliocene age.
- Weesatche soils are on footslopes and toeslopes of interfluves or hillslopes formed in calcareous loamy residuum weathered from sandstone of Pliocene age.

Soil Description

Pernitas

Landscape: Inland, dissected coastal plains
Landforms: Paleoterraces
Geomorphic positions, two-dimensional: Summit, shoulder, backslope
Geomorphic positions, three-dimensional: Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy alluvium in the Oakville Sandstone and Fleming Formation of Miocene age or (to a lesser extent) in the Goliad Formation of Miocene Pliocene age

Typical Profile

A—0 to 7 inches; moderately alkaline fine sandy loam
Bt—7 to 16 inches; moderately alkaline sandy clay loam
Btk—16 to 38 inches; moderately alkaline clay loam
Bk—38 to 80 inches; moderately alkaline sandy clay loam

Properties and Qualities

Slope: 1 to 5 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (moderate)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.4 inches (high)
Natural drainage class: Well drained
Runoff: Very low
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 2e
Land capability irrigated: None specified
Ecological site name: Gray Sandy Loam 20-25" PZ
Ecological site number: R083CY456TX
Typical vegetation: Hooded windmill grass, lovegrass tridens, other perennial grasses, pink pappusgrass, plains bristlegrass, tanglehead, multiflower false Rhodes grass, false Rhodes grass, Arizona cottontop, buffalograss, other shrubs, other perennial forbs, vine mesquite

Use and Management

Major land uses: The major land uses for this soil are livestock grazing and wildlife habitat. Some areas are used for food plots for wildlife enhancement.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

PtC—Pernitas sandy clay loam, 1 to 5 percent slopes

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 245 to 800 feet

Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Pernitas and similar soils: 85 percent
Minor components: 15 percent

The composition of this map unit is based on cumulative field observations and descriptions from 5 transects with 50 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 60 to 95 percent Pernitas and similar soils and 5 to 40 percent minor components including Alet, Annarose, Benavides, Sarnosa, and Weesatche soils.

- Alet soils are on drainageways formed in alluvium of Holocene age.
- Annarose soils are on summits and shoulders of broad interfluves and ridges and are formed in calcareous sandy and loamy sediments underlain by sandstone of Miocene age.
- Benavides soils are on summits and shoulders of interfluves and are formed in calcareous loamy sediments of Pliocene age.
- Sarnosa soils are on hill slopes and were formed in calcareous sandstone and loamy soil materials of sandstone of Miocene age and Pliocene age.
- Weesatche soils are on footslopes and toeslopes of interfluves or hillslopes formed in calcareous loamy residuum weathered from sandstone of Pliocene age.

Soil Description

Pernitas

Landscape: Inland, dissected coastal plains
Landforms: Paleoterraces
Geomorphic positions, two-dimensional: Summit, shoulder, backslope
Geomorphic positions, three-dimensional: Nose slope, interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy alluvium

Typical Profile

A—0 to 7 inches; moderately alkaline sandy clay loam
Bt—7 to 16 inches; moderately alkaline clay loam
Btk—16 to 38 inches; moderately alkaline sandy clay loam
Bk—38 to 80 inches; moderately alkaline sandy clay loam

Properties and Qualities

Slope: 1 to 5 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (moderate)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 8.8 inches (moderate)
Natural drainage class: Well drained

Runoff: Very low
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 2e
Land capability irrigated: None specified
Ecological site name: Gray Sandy Loam 20-25" PZ
Ecological site number: R083CY456TX
Typical vegetation: Hooded windmill grass, lovegrass tridens, other perennial grasses, pink pappusgrass, plains bristlegrass, tanglehead, multiflower false Rhodes grass, false Rhodes grass, Arizona cottontop, buffalograss, other shrubs, other perennial forbs, vine mesquite

Use and Management

Major land uses: The major land uses for this soil are livestock grazing and wildlife habitat. Some areas are used for food plots for wildlife enhancement.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

RNB—Rhymes-Nusil complex, 1 to 3 percent slopes

Setting

Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 75 to 445 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Rhymes and similar soils: 60 percent
Nusil and similar soils: 30 percent
Minor components: 10 percent

The composition of this map unit is based on cumulative field observations and descriptions from 1 transect and 10 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 30 to 70 percent Rhymes and similar soils, 15 to 40 percent Nusil and similar soils, and 0 to 55 percent minor components including Wilco soils.

- Wilco soils are on paleoterraces and are formed in sandy alluvium and eolian deposits over loamy and clayey residuum derived from sandstone and claystone bedrock of Eocene age.

Soil Description

Rhymes

Landscape: River valleys
Landforms: Stream terraces
Geomorphic positions, three-dimensional: Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy alluvium

Typical Profile

A—0 to 6 inches; neutral loamy fine sand
E and BE—6 to 43 inches; neutral loamy sand
Bt—43 to 80 inches; neutral sandy clay loam

Properties and Qualities

Slope: 1 to 3 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.2 to 0.6 in/hr (moderately slow)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 5.0 inches (low)
Natural drainage class: Somewhat excessively drained
Runoff: Very low
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 6e
Land capability irrigated: 4e
Ecological site name: Sandy 20-35" PZ
Ecological site number: R083AY406TX
Typical vegetation: Seacoast bluestem, tanglehead, yellow Indiangrass, fringeleaf paspalum, hooded windmill grass, other perennial forbs, other perennial grasses, sand dropseed

Nusil

Landscape: River valleys
Landforms: Stream terraces
Geomorphic positions, three-dimensional: Tread
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy alluvium

Typical Profile

A—0 to 9 inches; neutral fine sand
E—9 to 25 inches; neutral fine sand
Bt1—25 to 43 inches; neutral sandy clay loam
Bt2—72 to 80 inches; neutral sandy clay loam

Properties and Qualities

Slope: 1 to 3 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.2 to 0.6 in/hr (moderately slow)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 3.7 inches (low)

Natural drainage class: Moderately well drained
Runoff: Low
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 4e
Land capability irrigated: 3e
Ecological site name: Sandy 20-35" PZ
Ecological site number: R083AY406TX
Typical vegetation: Seacoast bluestem, tanglehead, yellow Indiangrass, fringeleaf paspalum, hooded windmill grass, other perennial forbs, other perennial grasses, sand dropseed

Use and Management

Major land uses: The major land uses for this soil are livestock grazing and wildlife habitat. Some areas are used for food plots for wildlife enhancement.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

RoB—Rosenbrock clay, 1 to 3 percent slopes

Setting

Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 320 to 495 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Rosenbrock and similar soils: 70 percent
Minor components: 30 percent

The composition of this map unit is based on cumulative field observations and descriptions from 3 transects with 30 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 50 to 80 percent Rosenbrock and similar soils and 20 to 50 percent minor components including Choke, Condido, Eloso, and Pavelek soils.

- Choke soils are on erosion remnants and are formed in calcareous loamy residuum over tuffaceous sediments of Miocene age.
- Condido soils are on interfluves underlain by weakly cemented siltstone of Miocene age.
- Eloso soils are on broad interfluves and are formed in clayey sediments over noncalcareous weakly consolidated siltstone interbedded with thin layers of soft calcium carbonate of Miocene age.
- Pavelek soils are on ridges and are formed in clayey sediments over noncalcareous weakly cemented siltstone bedrock interbedded with layers of soft calcium carbonate of Miocene age.

Soil Description

Rosenbrock

Landscape: Inland, dissected coastal plains
Landforms: Interfluves

Geomorphic positions, two-dimensional: Backslope
Geomorphic positions, three-dimensional: Crest, free face, side slope, interfluve, nose slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Clayey alluvium over weakly cemented tuffaceous siltstone

Typical Profile

A—0 to 6 inches; moderately alkaline clay
Bw—6 to 44 inches; moderately alkaline clay
Bkss—44 to 56 inches; moderately alkaline clay
BCk—56 to 63 inches; moderately alkaline clay loam
2Cdk—63 to 80 inches; moderately alkaline tuffaceous siltstone that has silt loam texture

Properties and Qualities

Slope: 1 to 3 percent
Depth to first restrictive layer: 63 inches to densic bedrock
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (very slow)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 10.2 inches (high)
Natural drainage class: Well drained
Runoff: Very high
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 2e
Land capability irrigated: None specified
Ecological site name: Rolling Blackland 25-35" PZ
Ecological site number: R083AY399TX
Typical vegetation: Arizona cottontop, sideoats grama, Texas cupgrass, bristlegrass, buffalograss, vine mesquite, awnless bushsunflower, silver bluestem, Texas wintergrass, false Rhodes grass, little bluestem, multiflower false Rhodes grass, other perennial forbs, southwestern bristlegrass

Use and Management

Major land uses: The major land uses for this soil are livestock grazing and wildlife habitat. Some areas are used for food plots for wildlife enhancement.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

SaB—Salco fine sandy loam, 1 to 3 percent slopes

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 160 to 620 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Salco and similar soils: 85 percent
Minor components: 15 percent

The composition of this map unit is based on cumulative field observations and descriptions from 6 transects with 73 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 70 to 90 percent Salco and similar soils and 10 to 30 percent minor components including Houla, Lomart, and Tela soils.

- Houla soils are on broad flats and footslope positions on erosional remnants and are formed in loamy, calcareous, sediments underlain by tuffaceous sandstones of Miocene age.
- Lomart soils are on summit positions on erosional remnants and are formed in loamy sediments underlain by sandstones of Miocene age.
- Tela soils are on broad drainageways and are formed in loamy alluvium or Quaternary age.

Soil Description

Salco

Landscape: Inland, dissected coastal plains
Landforms: Interfluves
Geomorphic positions, two-dimensional: Backslope, footslope
Geomorphic positions, three-dimensional: Head slope, base slope, side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy, calcareous, alluvium and/or tuffaceous residuum of Miocene age

Typical Profile

A and AB—0 to 10 inches; slightly alkaline fine sandy loam
Bt—10 to 20 inches; moderately alkaline clay loam
Btk—20 to 45 inches; moderately alkaline sandy clay loam
Bk—45 to 80 inches; moderately alkaline fine sandy loam

Properties and Qualities

Slope: 1 to 3 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (moderate)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.5 inches (high)
Natural drainage class: Well drained
Runoff: Very low
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 2s
Land capability irrigated: None specified
Ecological site name: Gray Loamy Upland 20-25" PZ
Ecological site number: R083CY455TX

Typical vegetation: Multiflower false Rhodes grass, Arizona cottontop, pink pappusgrass, plains bristlegrass, other perennial grasses, other perennial forbs, sideoats grama, sand dropseed, hooded windmill grass, fall witchgrass, lovegrass tridens, other shrubs, other annual forbs, green sprangletop, other trees

Use and Management

Major land uses: The major land uses for this soil are livestock grazing and wildlife habitat. (fig. 9)

Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

ScD—Sancajo very gravelly loam, 1 to 8 percent slopes

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 200 to 495 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

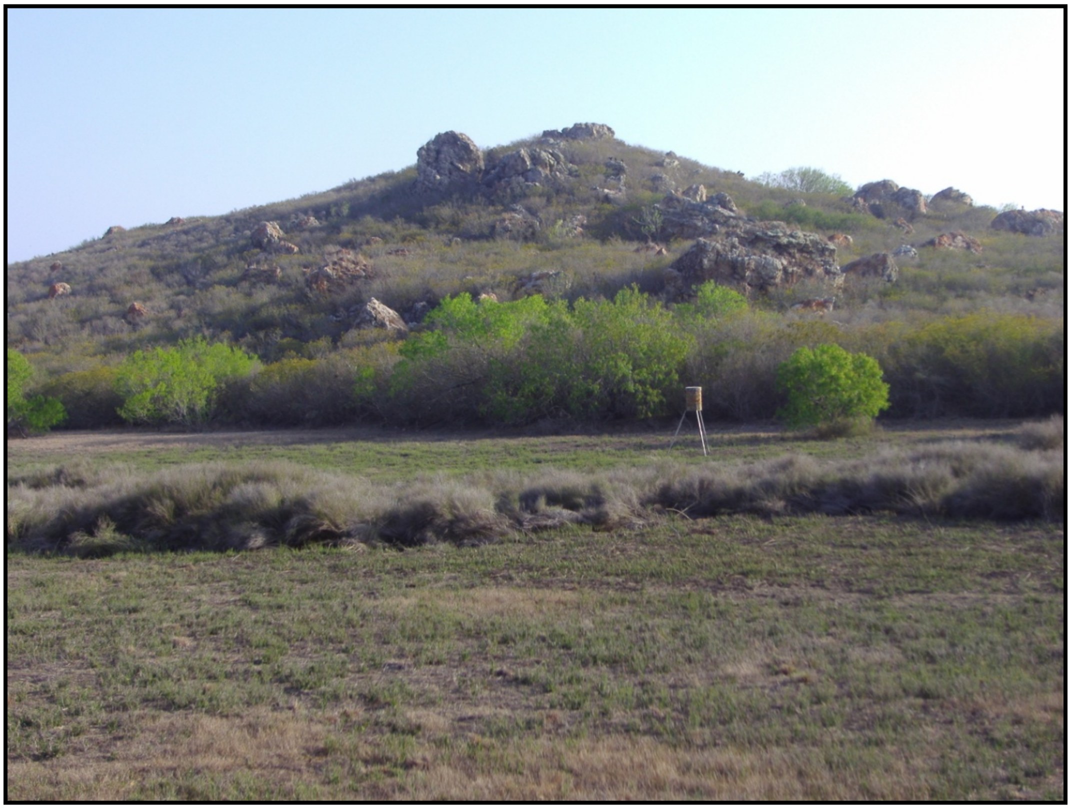

Figure 9.—Pastureland on an area of Salco fine sandy loam, 1 to 3 percent slopes, in the foreground. This area was cleared of brush and is being managed for wildlife enhancement. The background is an area or Verick fine sandy loam, 1 to 5 percent slopes. Rock outcrop is a minor component in the map unit.

Composition

Major components:
Sancajo and similar soils: 80 percent
Minor components: 20 percent

The composition of this map unit is based on cumulative field observations and descriptions from 2 transects with 17 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 70 to 90 percent Sancajo and similar soils and 10 to 30 percent minor components including Choke, Eloso, and Pavelek soils.

- Choke soils are on erosion remnants and are formed in calcareous loamy residuum over tuffaceous sediments of Miocene age.
- Eloso soils are on broad interfluves and are formed in clayey sediments underlain by noncalcareous weakly consolidated siltstone interbedded with thin layers of soft calcium carbonate of Miocene age.
- Pavelek soils are on ridges and are formed in clayey sediments underlain by noncalcareous weakly cemented siltstone bedrock interbedded with layers of soft calcium carbonate of Miocene age.

Soil Description

Sancajo

Landscape: Inland, dissected coastal plains
Landforms: Interfluves, ridges
Geomorphic positions, two-dimensional: Summit, shoulder
Geomorphic positions, three-dimensional: Nose slope, crest, interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy alluvium over weakly cemented siltstone

Typical Profile

A1—0 to 6 inches; moderately alkaline very gravelly loam
A2—6 to 11 inches; moderately alkaline extremely cobbly loam
Bkkm—11 to 18 inches; moderately alkaline cemented material
BCk—18 to 38 inches; moderately alkaline silt loam
Cr—38 to 80 inches; moderately alkaline weakly cemented siltstone with a texture of silt loam

Properties and Qualities

Slope: 1 to 8 percent
Percent of area covered by surface fragments: About 10 percent subangular medium and coarse gravel, about 20 percent angular channers
Depth to first restrictive layer: 11 inches to petrocalcic
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (moderate)
Slowest permeability below the first cemented restrictive layer to 60 inches: 0.001 to 0.06 in/hr (very slow)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 0.9 inches (very low)
Natural drainage class: Well drained
Runoff: Very high
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 7s
Land capability irrigated: None specified
Ecological site name: Shallow Ridge 20-25" PZ
Ecological site number: R083CY485TX
Typical vegetation: Tanglehead, Arizona cottontop, plains bristlegrass, other perennial forbs, other trees, pinhole bluestem, little bluestem, Texas grama, curly-mesquite, false Rhodes grass, multiflower false Rhodes grass, plains lovegrass, sand dropseed, other shrubs, other perennial grasses, slim tridens

Use and Management

Major land uses: The major land uses of this soil are rangeland and wildlife habitat.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

SrC—Sarnosa fine sandy loam, 2 to 5 percent slopes

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 200 to 400 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Sarnosa and similar soils: 80 percent
Minor components: 20 percent

The composition of this map unit is based on cumulative field observations and descriptions from 3 transects with 27 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 65 to 95 percent Sarnosa and similar soils and 5 to 35 percent minor components including Annarose, Pernitas, and Weesatche soils.

- Annarose soils are on summits and shoulders of broad interfluves and ridges and are formed in calcareous sandy and loamy sediments underlain by sandstone of Miocene age.
- Pernitas soils are on summits, backslopes, and footslopes of paleoterraces and are formed in calcareous, loamy sediments of Pleistocene and Pliocene age.
- Weesatche soils are on footslopes and toeslopes of interfluves or on hillslopes and are formed in calcareous loamy residuum weathered from sandstone of Pliocene age.

Soil Description

Sarnosa

Landscape: Inland, dissected coastal plains
Landforms: Interfluves
Geomorphic positions, two-dimensional: Backslope
Geomorphic positions, three-dimensional: Side slope, nose slope, interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy residuum weathered from sandstone

Typical Profile

A—0 to 15 inches; moderately alkaline fine sandy loam
Bk1—15 to 30 inches; moderately alkaline fine sandy loam
Bk2—30 to 51 inches; moderately alkaline fine sandy loam
BCk—51 to 80 inches; moderately alkaline sandy clay loam

Properties and Qualities

Slope: 2 to 5 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (moderate)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 6.6 inches (moderate)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 4e
Land capability irrigated: None specified
Ecological site name: Gray Sandy Loam 20-25" PZ
Ecological site number: R083CY456TX
Typical vegetation: Green sprangletop, hooded windmill grass, pink pappusgrass, plains bristlegrass, tanglehead, Arizona cottontop, cane bluestem, curly-mesquite, false Rhodes grass, multiflower false Rhodes grass, other shrubs, other perennial forbs, other perennial grasses, plains lovegrass

Use and Management

Major land uses: The major land uses of this soil are rangeland and pastureland.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

StB—Sinton sandy clay loam, 0 to 2 percent slopes, frequently flooded

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 492 to 495 feet
Mean annual precipitation: 22 to 39 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Sinton frequently flooded and similar soils: 75 percent
Minor components: 25 percent

The composition of this map unit is based on cumulative field observations and descriptions from 3 transects with 28 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 30 to 88 percent Sinton and similar soils and 12 to 70 percent minor components including Alet, Buchel, and Zavala soils.

- Alet soils are on drainageways formed in alluvium of Holocene age.
- Buchel soils are on frequently flooded flood plains and are formed in clayey, calcareous alluvial sediments of Holocene age.
- Zavala soils are on flood plains along drainageways and are formed in loamy alluvial sediments of Holocene age.

Soil Description

Sinton soils, frequently flooded

Landscape: River valleys
Landforms: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear, concave
Parent material: Loamy alluvium

Typical Profile

A—0 to 9 inches; slightly alkaline sandy clay loam
Bw—9 to 80 inches; slightly alkaline sandy clay loam

Properties and Qualities

Slope: 0 to 2 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (moderate)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 7.7 inches (moderate)
Natural drainage class: Well drained
Runoff: Very low
Flooding frequency: Frequent

Interpretive Groups

Land capability nonirrigated: 3w
Land capability irrigated: 3w
Ecological site name: Loamy Bottomland 20-35" PZ
Ecological site number: R083CY462TX
Typical vegetation: Little bluestem, other perennial grasses, vine mesquite, multiflower false Rhodes grass, false Rhodes grass, big sandbur, buffalograss, other shrubs, pink pappusgrass, plains bristlegrass, sideoats grama, southwestern bristlegrass, switchgrass, Texas wintergrass, Virginia wildrye

Use and Management

Major land uses: The major land uses of this soil are rangeland and wildlife habitat.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

TaB—Tela sandy clay loam, 0 to 2 percent slopes, flooded

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 295 to 800 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Tela occasionally flooded and similar soils: 70 percent
Tela frequently flooded and similar soils: 20 percent
Minor components: 10 percent

The composition of this map unit is based on cumulative field observations and descriptions from 3 transects with 72 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 70 percent Tela, occasionally flooded; 20 percent Tela, frequently flooded; and 10 percent minor unnamed minor components.

- Unnamed minor components are found in concave low lying depressions formed in clayey alluvium of Holocene age.

Soil Description

Tela soils, occasionally flooded

Landscape: Inland, dissected coastal plains
Landforms: Drainageways
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Loamy alluvium

Typical Profile

A—0 to 8 inches; neutral sandy clay loam
Bt—8 to 16 inches; slightly alkaline sandy clay loam
Btk—16 to 80 inches; moderately alkaline sandy clay loam

Properties and Qualities

Slope: 0 to 2 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (moderate)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.8 inches (high)
Natural drainage class: Well drained
Runoff: Negligible
Flooding frequency: Occasional

Interpretive Groups

Land capability nonirrigated: 2w
Land capability irrigated: None specified
Ecological site name: Ramadero 20-25" PZ

Ecological site number: R083CY466TX
Typical vegetation: Multiflower false Rhodes grass, big sandbur, other perennial forbs, Arizona cottontop, sideoats grama, pink pappusgrass, vine mesquite, cane bluestem, bristlegrass, windmill grass, buffalograss, lovegrass tridens, other shrubs, curly-mesquite, other trees

Tela soils, frequently flooded

Landscape: Inland, dissected coastal plains
Landforms: Drainageways
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Loamy alluvium

Typical Profile

A—0 to 8 inches; neutral sandy clay loam
Bt—8 to 16 inches; slightly alkaline sandy clay loam
Bk—16 to 80 inches; moderately alkaline sandy clay loam

Properties and Qualities

Slope: 0 to 2 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (moderate)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.8 inches (high)
Natural drainage class: Well drained
Runoff: Negligible
Flooding frequency: Frequent

Interpretive Groups

Land capability nonirrigated: 3w
Land capability irrigated: None specified
Ecological site name: Ramadero 20-25" PZ
Ecological site number: R083CY466TX
Typical vegetation: Multiflower false Rhodes grass, big sandbur, other perennial forbs, Arizona cottontop, sideoats grama, pink pappusgrass, vine mesquite, cane bluestem, bristlegrass, windmill grass, buffalograss, lovegrass tridens, other shrubs, curly-mesquite, other trees

Use and Management

Major land uses: The major land uses for this soil are livestock production and wildlife habitat. Some areas are used for forage production.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

ToB—Tordia clay, 0 to 3 percent slopes

Setting

Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 200 to 495 feet

Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Tordia and similar soils: 90 percent
Minor components: 10 percent

The composition of this map unit is based on cumulative field observations and descriptions from 3 transects with 58 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 80 to 95 percent Tordia and similar soils and 5 to 20 percent minor components including Esseville, Fashing, and Weigang soils.

- Esseville soils are on side slopes of interfluves underlain by clayey residuum derived from mudstones of Oligocene and Eocene age.
- Fashing soils are on summits of ridges and interfluves derived from clayey materials over thick beds of interbedded claystones, mudstones, and sandstones of Oligocene and Eocene age.
- Weigang soils are on ridges and are formed in loamy materials underlain by sandstone or interbedded sandstone and claystone bedrock of Oligocene and Eocene age.

Soil Description

Tordia

Landscape: Inland, dissected coastal plains
Landforms: Broad interfluves
Geomorphic positions, two-dimensional: Shoulder, backslope
Geomorphic positions, three-dimensional: Side slope, nose slope, interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Clayey alluvium over clayey residuum weathered from shale and siltstone

Typical Profile

A—0 to 7 inches; slightly alkaline clay
Bss—7 to 20 inches; slightly alkaline clay
Bkss—20 to 39 inches; slightly alkaline clay
2BCkyz—39 to 53 inches; slightly alkaline clay
2Cdkyz—53 to 80 inches; moderately alkaline mudstone bedrock that has clay texture

Properties and Qualities

Slope: 0 to 3 percent
Percent of area covered by surface fragments: Less than 1 percent subrounded gravel
Depth to first restrictive layer: 40 to 57 inches to densic bedrock
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (very slow)
Slowest permeability below the first cemented restrictive layer to 60 inches: 0.001 to 0.06 in/hr (very slow)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic

Representative total available water capacity to 60 inches: About 8.4 inches (moderate)
Natural drainage class: Well drained
Runoff: High
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 2e
Ecological site name: Rolling Blackland 25-35" PZ
Ecological site number: R083AY399TX
Typical vegetation: Sideoats grama, false Rhodes grass, pinhole bluestem, plains lovegrass, Texas cupgrass, vine mesquite, buffalograss, plains bristlegrass, curly-mesquite, Texas wintergrass, other perennial forbs, other annual forbs

Use and Management

Major land uses: The major land uses for this soil are livestock grazing and wildlife habitat. Some areas are used for food plots for wildlife enhancement.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

VeC—Verick fine sandy loam, 1 to 5 percent slopes

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 200 to 895 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Verick and similar soils: 80 percent
Minor components: 20 percent

The composition of this map unit is based on cumulative field observations and descriptions from 2 transects with 27 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 80 percent Verick and similar soils and 20 percent minor components including Picosa and Rock Outcrop soils.

- Picosa soils are on cuestas and are formed in tuffaceous sandstone and claystone sediments containing volcanic ash or shards on geological formations of the Tertiary period.
- Rock Outcrop occurs on side slopes, head slopes, cuestas, summits and other landforms and is of the Tertiary period.

Soil Description

Verick

Landscape: Inland, dissected coastal plains
Landforms: Ridges
Geomorphic positions, two-dimensional: Summit
Geomorphic positions, three-dimensional: Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Calcareous loamy residuum weathered from sandstone

Typical Profile

A—0 to 2 inches; neutral fine sandy loam
Bt and Btk—2 to 8 inches; neutral sandy clay loam
Cr—8 to 80 inches; moderately alkaline sandstone bedrock

Properties and Qualities

Slope: 1 to 5 percent
Percent of area covered by surface fragments: About 5 percent angular channers
Depth to first restrictive layer: 6 to 20 inches to paralithic bedrock
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (moderate)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 1.2 inches (very low)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 6e
Land capability irrigated: 3e
Ecological site name: Shallow Sandy Loam 18-25" PZ
Ecological site number: R083BY440TX
Typical vegetation: False Rhodes grass, hooded windmill grass, plains bristlegrass, other perennial grasses, pinhole bluestem, pink pappusgrass, Arizona cottontop, buffalograss, curly-mesquite, other shrubs, other perennial forbs

Use and Management

Major land uses: The major land uses for this soil are wildlife habitat and livestock grazing.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

VrC—Viboras clay, 1 to 5 percent slopes

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 245 to 895 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 71 to 74 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Viboras and similar soils: 90 percent
Minor components: 10 percent

The composition of this map unit is based on cumulative field observations and descriptions from 2 transects with 20 observations of the map unit. There is an estimated 90 percent probability that the composition of the map unit is 80 to 95 percent Viboras and similar soils and 5 to 20 percent minor components including Cotulla, Esseville, and Maverick soils.

- Cotulla soils are on footslopes and side slopes of broad interfluves and are formed in calcareous, saline, clayey sediments interbedded with claystone and sandstone of Oligocene and Eocene age.
- Esseville soils are on side slopes of interfluves underlain by clayey residuum derived from mudstones of Oligocene and Eocene age.
- Maverick soils are on ridges and interfluves and are formed in calcareous, saline clayey residuum weathered from Cretaceous and Tertiary mudstone.

Soil Description

Viboras

Landscape: Inland, dissected coastal plains
Landforms: Valley floors, valley sides
Geomorphic positions, two-dimensional: Shoulder, backslope
Geomorphic positions, three-dimensional: Side slope
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Calcareous, sodic clayey residuum weathered from mudstone, shale, and siltstone

Typical Profile

A—0 to 6 inches; moderately alkaline clay
Bkn and Bknyz—6 to 28 inches; moderately alkaline clay and clay loam
Cdknz—28 to 80 inches; moderately alkaline mudstone that has clay texture

Properties and Qualities

Slope: 1 to 5 percent
Percent of area covered by surface fragments: About 2 percent rounded gravel
Depth to first restrictive layer: 20 to 39 inches to densic bedrock
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (very slow)
Salinity, representative within 40 inches: Saline
Salinity, maximum within 40 inches: Saline
Sodicity, representative within 40 inches: Sodic
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: About 3.7 inches (low)
Natural drainage class: Moderately well drained
Runoff: Very high
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 5s
Land capability irrigated: None specified
Ecological site name: Saline Clay 18-25" PZ
Ecological site number: R083BY432TX
Typical vegetation: Alkali sacaton, false Rhodes grass, tobosagrass, vine mesquite, curly-mesquite, buffalograss, annual grasses, Arizona cottontop, other shrubs, other perennial forbs, other perennial grasses, whiplash pappusgrass, white tridens

Use and Management

Major land uses: The major land uses for this soil are livestock production and wildlife habitat. Some areas are used for forage production.

Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

W—Water

This map unit includes rivers, streams, lakes, and ponds. These areas are covered with water in most years, at least during the period that is warm enough for plants to grow. Many areas are covered with water year-round.

WbB—Webb very fine sandy loam, 1 to 3 percent slopes

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 400 to 1,000 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 72 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Webb and similar soils: 85 percent
Minor components: 15 percent

The composition of this map unit is based on cumulative field observations and descriptions from 2 transects with 20 observations of the map unit. There is an estimated 85 percent probability that the composition of the map unit is 75 to 90 percent Webb and similar soils and 10 to 25 percent minor components including Hindes, Maverick, Tiocano, and Zavco soils.

- Hindes soils are on paleoterraces of Pliocene or early Pleistocene age.
- Maverick soils are on summits and shoulders of interfluves underlain by mudstone of Eocene age.
- Tiocano soils are found in concave enclosed depressions of Pleistocene age.
- Zavco soils are on summits, shoulders, and backslopes of interfluves underlain by sandstone of Eocene age.

Soil Description

Webb

Landscape: Inland, dissected coastal plains
Landforms: Interfluves
Geomorphic positions, two-dimensional: Summit, shoulder
Geomorphic positions, three-dimensional: Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy residuum weathered from sandstone

Typical Profile

A—0 to 14 inches; slightly acid fine sandy loam and very fine sandy loam
Bt—14 to 28 inches; neutral sandy clay
Btk—28 to 80 inches; slightly alkaline sandy clay loam

Properties and Qualities

Slope: 1 to 3 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.2 to 0.6 in/hr (moderately slow)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.1 inches (high)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 2e
Ecological site name: Tight Sandy Loam 20-25" PZ
Ecological site number: R083AY411TX
Typical vegetation: False Rhodes grass, pink pappusgrass, plains bristlegrass, tanglehead, Arizona cottontop, buffalograss, curly-mesquite, hooded windmill grass, other shrubs, other perennial forbs, other perennial grasses, pinhole bluestem, plains lovegrass, sideoats grama

Use and Management

Major land uses: The major land uses of this soil are livestock grazing and wildlife habitat. Some areas are used for forage production.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

WeB—Weesatche fine sandy loam, 0 to 3 percent slopes

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 295 to 800 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Weesatche and similar soils: 85 percent
Minor components: 15 percent

The composition of this map unit is based on cumulative field observations and descriptions from 6 transects with 104 observations of the map unit. There is an estimated 85 percent probability that the composition of the map unit is 80 to 95 percent Weesatche and similar soils and 5 to 20 percent minor components including Alet, Annarose, Pernitas, and Sarnosa soils.

- Alet soils are on upland drainageways and low stream terraces of Quaternary age.

- Annarose soils are on summits and shoulders of broad interfluves underlain by sandstone of Miocene age.
- Pernitas soils are on shoulders, backslopes, and footslopes of paleoterraces of Pliocene or early Pleistocene age.
- Sarnosa soils are on summits and shoulders of hillslopes underlain by sandstone of Miocene and early Pleistocene age.

Soil Description

Weesatche

Landscape: Inland, dissected coastal plains
Landforms: Paleoterraces
Geomorphic positions, two-dimensional: Footslope
Geomorphic positions, three-dimensional: Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium

Typical Profile

A—0 to 7 inches; neutral fine sandy loam
Bt—7 to 21 inches; slightly alkaline sandy clay loam
Btk—21 to 48 inches; moderately alkaline sandy clay loam
Bk—48 to 80 inches; moderately alkaline sandy clay loam

Properties and Qualities

Slope: 0 to 3 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (moderate)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 8.8 inches (moderate)
Natural drainage class: Well drained
Runoff: Very low
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: None specified
Ecological site name: Sandy Loam 25-35" PZ
Ecological site number: R083CY481TX
Typical vegetation: Multiflower false Rhodes grass, hooded windmill grass, Arizona cottontop, tanglehead, southwestern bristlegrass, plains bristlegrass, pappusgrass, beardgrass, other shrubs, other perennial forbs, other annual forbs

Use and Management

Major land uses: The major land uses for this soil are livestock grazing and wildlife habitat. Some areas are used for forage production and crop production.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

WeC—Weesatche fine sandy loam, 3 to 5 percent slopes

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 295 to 800 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Weesatche and similar soils: 86 percent
Minor components: 14 percent

The composition of this map unit is based on cumulative field observations and descriptions from 6 transects with 104 observations of the map unit. There is an estimated 86 percent probability that the composition of the map unit is 80 to 95 percent Weesatche and similar soils and 5 to 20 percent minor components including Alet, Annarose, Pernitas, and Sarnosa soils.

- Alet soils are on upland drainageways and low stream terraces.
- Annarose soils are on summits and shoulders of broad interfluves underlain by sandstone of Miocene age.
- Pernitas soils are on shoulders, backslopes, and footslopes of paleoterraces of Pliocene or early Pleistocene age.
- Sarnosa soils are on summits and shoulders of hillslopes underlain by sandstone of Miocene and early Pleistocene age.

Soil Description

Weesatche

Landscape: Inland, dissected coastal plains
Landforms: Paleoterraces
Geomorphic positions, two-dimensional: Footslope
Geomorphic positions, three-dimensional: Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium

Typical Profile

A—0 to 7 inches; neutral fine sandy loam
Bt—7 to 21 inches; slightly alkaline sandy clay loam
Btk—21 to 48 inches; moderately alkaline sandy clay loam
Bk—48 to 80 inches; moderately alkaline sandy clay loam

Properties and Qualities

Slope: 3 to 5 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (moderate)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic

Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 8.5 inches (moderate)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: None specified
Ecological site name: Sandy Loam 25-35" PZ
Ecological site number: R083CY481TX
Typical vegetation: Multiflower false Rhodes grass, hooded windmill grass, Arizona cottontop, tanglehead, southwestern bristlegrass, plains bristlegrass, Pappusgrass, beardgrass, other shrubs, other perennial forbs, other annual forbs

Use and Management

Major land uses: The major land uses for this soil are livestock grazing (fig. 10) and wildlife habitat. Some areas are used for forage production and crop production.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

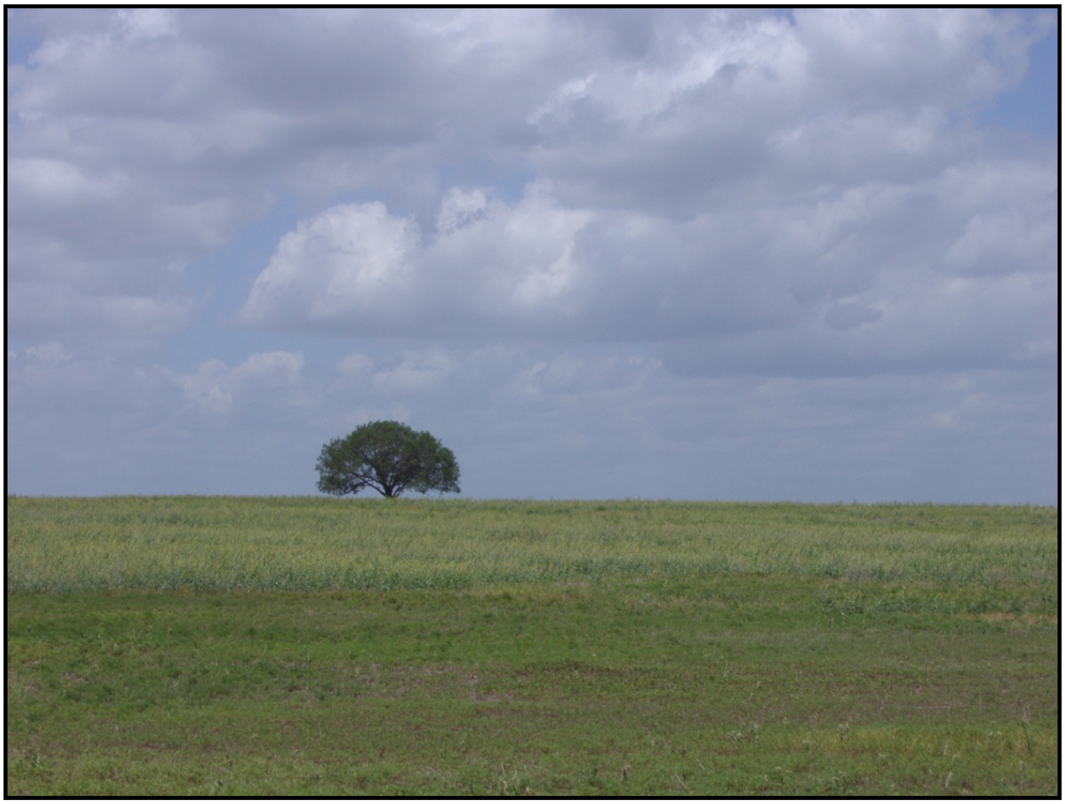

Figure 10.—Pastureland on an area of Weesatche fine sandy loam, 3 to 5 percent slopes. Weesatche soils are well suited to pastureland.

WgC—Weigang fine sandy loam, 1 to 5 percent slopes

Setting

Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 210 to 470 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Weigang and similar soils: 87 percent
Minor components: 13 percent

The composition of this map unit is based on cumulative field observations and descriptions from 5 transects with 45 observations of the map unit. There is an estimated 87 percent probability that the composition of the map unit is 40 to 95 percent Weigang and similar soils and 5 to 60 percent minor components including Picosa and Whitsett soils.

- Picosa soils are on summits on cuestas underlain by Eocene sandstones.
- Whitsett soils are on summits and shoulders on broad interfluves underlain by Oligocene age sandstones.

Soil Description

Weigang

Landscape: Inland, dissected coastal plains
Landforms: Ridges
Geomorphic positions, two-dimensional: Backslope
Geomorphic positions, three-dimensional: Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy residuum weathered from sandstone

Typical Profile

A—0 to 6 inches; neutral fine sandy loam
Bt—6 to 13 inches; neutral sandy clay loam
Btk—13 to 17 inches; slightly alkaline sandy clay loam
Bk—17 to 19 inches; slightly alkaline sandy clay loam
Crk—19 to 80 inches; weakly cemented sandstone bedrock

Properties and Qualities

Slope: 1 to 5 percent
Percent of area covered by surface fragments: Less than 1 percent angular channers
Depth to first restrictive layer: 8 to 20 inches to paralithic bedrock
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.06 to 0.2 in/hr (slow)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 2.8 inches (very low)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 6e
Land capability irrigated: None specified
Ecological site name: Shallow 25-35" PZ
Ecological site number: R083AY408TX
Typical vegetation: Pink pappusgrass, sideoats grama, other shrubs, other perennial grasses, pinhole bluestem, Arizona cottontop, buffalograss, curly-mesquite, other perennial forbs, plains bristlegrass, plains lovegrass

Use and Management

Major land uses: The major land uses for this soil are livestock grazing, forage production, and wildlife habitat.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

WhC—Whitsett fine sandy loam, 1 to 5 percent slopes

Setting

Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 205 to 490 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Whitsett and similar soils: 60 percent
Minor components: 40 percent

The composition of this map unit is based on cumulative field observations and descriptions from 3 transects with 49 observations of the map unit. There is an estimated 68 percent probability that the composition of the map unit is 50 to 70 percent Whitsett and similar soils and 30 to 50 percent minor components including Laparita, Picosa, Sarnosa, and Weigang soils.

- Laparita soils are on foot slopes of interfluves underlain by Eocene age mudstones.
- Picosa soils are on summits on cuestas underlain by Eocene sandstones.
- Sarnosa soils are on summits and side slopes of interfluves underlain by Miocene age sandstones.
- Weigang soils are on summits of ridges underlain by Eocene age sandstones.

Soil Description

Whitsett

Landscape: Inland, dissected coastal plains
Landforms: Ridges
Geomorphic positions, two-dimensional: Shoulder, backslope
Geomorphic positions, three-dimensional: Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Fine-loamy residuum weathered from sandstone and shale

Typical Profile

A—0 to 4 inches; neutral fine sandy loam
Bt—4 to 13 inches; neutral sandy clay loam
Btk and BCk—13 to 31 inches; slightly alkaline clay loam
Cr—31 to 80 inches; weakly cemented sandstone bedrock

Properties and Qualities

Slope: 1 to 5 percent
Percent of area covered by surface fragments: Less than 1 percent angular gravel
Depth to first restrictive layer: 20 to 40 inches to paralithic bedrock
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.06 to 0.2 in/hr (slow)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 3.9 inches (low)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 2e
Land capability irrigated: None specified
Ecological site name: Shallow 18-25" PZ
Ecological site number: R083BY439TX
Typical vegetation: Pink pappusgrass, sideoats grama, other shrubs, other perennial grasses, pinhole bluestem, Arizona cottontop, buffalograss, curly-mesquite, other perennial forbs, plains bristlegrass, plains lovegrass

Use and Management

Major land uses: The major land uses for this soil are livestock grazing and wildlife habitat.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

WPD—Whitsett-Picosa complex, 1 to 8 percent slopes

Setting

Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 205 to 490 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Whitsett and similar soils: 60 percent
Picosa and similar soils: 30 percent
Minor components: 10 percent

The composition of this map unit is based on cumulative field observations and descriptions from 2 transects with 26 observations of the map unit. There is an estimated 90 percent probability that the composition of the map unit is 50 to 65 percent Whitsett and similar soils, 10 to 50 percent Picosa and similar soils, and 5 to 40 percent minor components including Laparita and Weigang soils.

- Laparita soils are on foot slopes of interfluves underlain by mudstones of Eocene age.
- Weigang soils are on summits of ridges underlain by sandstones of Eocene age.

Soil Description

Whitsett

Landscape: Inland, dissected coastal plains
Landforms: Ridges
Geomorphic positions, two-dimensional: Shoulder, backslope
Geomorphic positions, three-dimensional: Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy residuum weathered from sandstone and shale

Typical Profile

A—0 to 4 inches; slightly alkaline fine sandy loam
Bt—4 to 13 inches; moderately alkaline sandy clay loam
Btk and BCk—13 to 31 inches; moderately alkaline sandy clay loam
Cr—31 to 80 inches; weakly cemented sandstone bedrock

Properties and Qualities

Slope: 1 to 5 percent
Depth to first restrictive layer: 21 to 35 inches to paralithic bedrock
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.06 to 0.2 in/hr (slow)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 3.9 inches (low)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: None specified
Ecological site name: Shallow 25-35" PZ
Ecological site number: R083AY408TX
Typical vegetation: Pink pappusgrass, sideoats grama, other shrubs, other perennial grasses, pinhole bluestem, Arizona cottontop, buffalograss, curly-mesquite, other perennial forbs, plains bristlegrass, plains lovegrass

Picosa

Landscape: Inland, dissected coastal plains
Landforms: Ridges
Geomorphic positions, two-dimensional: Summit, shoulder
Geomorphic positions, three-dimensional: Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy residuum weathered from sandstone

Typical Profile

A—0 to 8 inches; slightly alkaline sandy clay loam
AC—8 to 19 inches; slightly alkaline sandy clay loam and tuffaceous sandstone
Cr—19 to 80 inches; tuffaceous sandstone bedrock

Properties and Qualities

Slope: 1 to 8 percent
Percent of area covered by surface fragments: About 1 percent angular channers
Depth to first restrictive layer: 6 to 18 inches to paralithic bedrock
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (moderate)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 0.8 inches (very low)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 7s
Land capability irrigated: 2s
Ecological site name: Shallow Ridge 20-32" PZ
Ecological site number: R083AY409TX
Typical vegetation: Sideoats grama, Arizona cottontop, other perennial forbs, other perennial grasses, plains bristlegrass, curly-mesquite, false Rhodes grass, little bluestem, multiflower false Rhodes grass, other shrubs, other trees, pinhole bluestem, sand dropseed, Texas grama

Use and Management

Major land uses: The major land use for this soil is wildlife habitat.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

ZaB—Zavala fine sandy loam, 0 to 2 percent slopes, flooded

Setting

Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 205 to 340 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Zavala frequently flooded and similar soils: 60 percent
Zavala occasionally flooded and similar soils: 20 percent
Minor components: 20 percent

The composition of this map unit is based on cumulative field observations and descriptions from 4 transects with 40 observations of the map unit. There is an estimated 80 percent probability that the composition of the map unit is 45 to 90 percent Zavala, frequently flooded and similar soils, 5 to 30 percent Zavala, occasionally flooded and similar soils, and 10 to 55 percent minor components including Clareville, Czar, and Imogene soils.

- Clareville soils are in drainageways and on treads of low stream terraces of the Quaternary period.
- Czar soils are in drainageways and on treads of low stream terraces of the Quaternary period.
- Imogene soils are on treads of stream terraces of the Quaternary period.

Soil Description

Zavala soils, frequently flooded

Landscape: River valleys
Landforms: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium

Typical Profile

A—0 to 19 inches; neutral fine sandy loam
C—19 to 80 inches; slightly alkaline fine sandy loam

Properties and Qualities

Slope: 0 to 1 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 2.0 to 6.0 in/hr (moderately rapid)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 6.1 inches (moderate)
Natural drainage class: Well drained
Runoff: Very low
Flooding frequency: Frequent

Interpretive Groups

Land capability nonirrigated: 3w
Land capability irrigated: None specified
Ecological site name: Loamy Bottomland 25-35" PZ
Ecological site number: R083AY573TX
Typical vegetation: False Rhodes grass, little bluestem, big sandbur, other shrubs, vine mesquite, other perennial grasses, other trees, plains bristlegrass, sideoats grama, switchgrass, Texas wintergrass, Virginia wildrye, white tridens, other perennial forbs, other annual forbs

Zavala soils, occasionally flooded

Landscape: River valleys
Landforms: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium

Typical Profile

A—0 to 11 inches; neutral fine sandy loam
C—11 to 80 inches; slightly alkaline fine sandy loam

Properties and Qualities

Slope: 0 to 2 percent
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 2.0 to 6.0 in/hr (moderately rapid)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 6.1 inches (moderate)
Natural drainage class: Well drained
Runoff: Very low
Flooding frequency: Occasional

Interpretive Groups

Land capability nonirrigated: 2w
Land capability irrigated: None specified
Ecological site name: Loamy Bottomland 25-35" PZ
Ecological site number: R083AY573TX
Typical vegetation: False Rhodes grass, little bluestem, big sandbur, other shrubs, vine mesquite, other perennial grasses, other trees, plains bristlegrass, sideoats grama, switchgrass, Texas wintergrass, Virginia wildrye, white tridens, other perennial forbs, other annual forbs

Use and Management

Major land uses: The major land uses of this soil are rangeland (fig. 11) and wildlife habitat.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

ZvC—Zavco sandy clay loam, 1 to 5 percent slopes

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 445 to 895 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 68 to 72 degrees F
Frost-free period: 265 to 301 days

Composition

Major components:
Zavco and similar soils: 90 percent
Minor components: 10 percent

The composition of this map unit is based on cumulative field observations and descriptions from 4 transects with 36 observations of the map unit. There is an estimated 90 percent probability that the composition of the map unit is 60 to 95 percent Zavco and similar soils and 5 to 40 percent minor components including Cotulla, Maverick, and Webb soils.

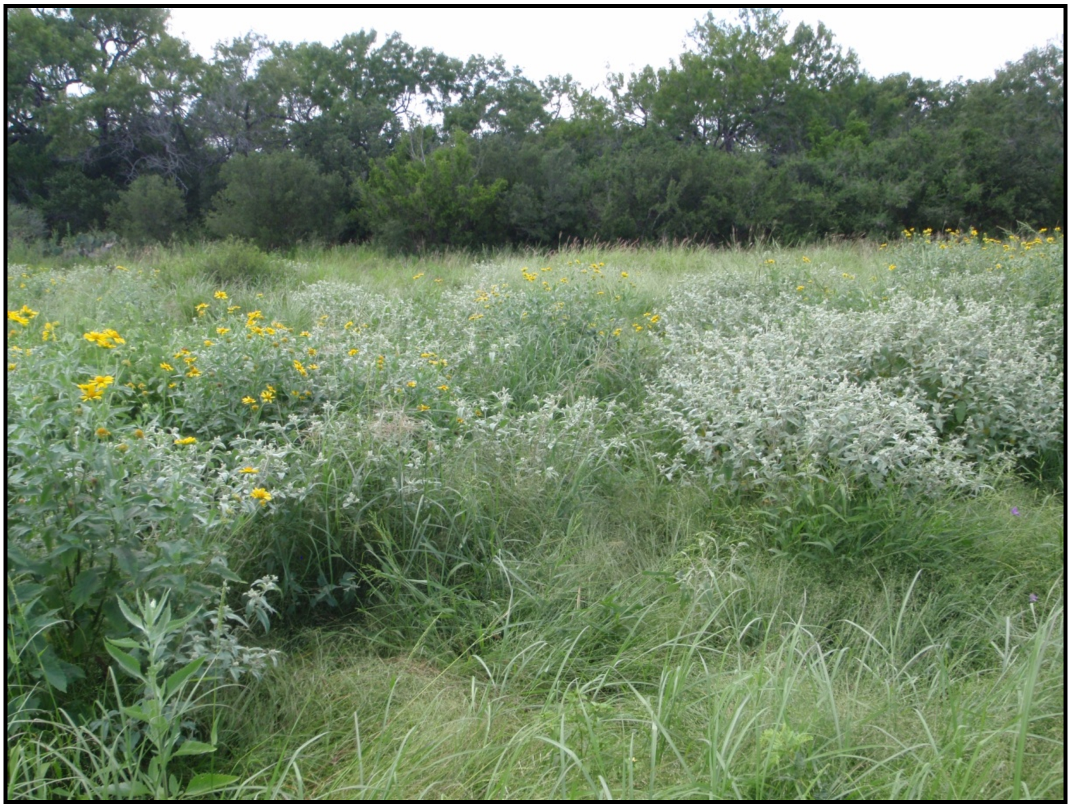

Figure 11.—Rangeland on an area of Zavala fine sandy loam, 0 to 2 percent slopes, flooded. These areas are well suited to use as rangeland. Zavala soils are in the Loamy Bottomland 25-35" PZ ecological site (MLRA 83A—Northern Rio Grande Plain).

- Cotulla soils are on footslopes and side slopes of broad interfluves and are formed in calcareous, saline, clayey sediments interbedded with claystone and sandstone of Oligocene and Eocene age.
- Maverick soils are on summits and shoulders of interfluves underlain by mudstone of Eocene age.
- Webb soils are on summits and shoulders of interfluves underlain by sandstone of Eocene age.

Soil Description

Zavco

Landscape: Inland, dissected coastal plains
Landforms: Broad interfluves
Geomorphic positions, two-dimensional: Footslope
Geomorphic positions, three-dimensional: Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy residuum weathered from shale

Typical Profile

A—0 to 5 inches; neutral sandy clay loam
Bt—5 to 27 inches; slightly alkaline sandy clay
Btk—27 to 51 inches; slightly alkaline clay loam
BCky—51 to 80 inches; moderately alkaline clay loam

Properties and Qualities

Slope: 1 to 5 percent
Percent of area covered by surface fragments: Less than 1 percent subrounded gravel
Depth to first restrictive layer: No restrictive layer
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.2 to 0.6 in/hr (moderately slow)
Salinity, representative within 40 inches: Non-saline
Salinity, maximum within 40 inches: Non-saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 7.7 inches (moderate)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: Not flooded

Interpretive Groups

Land capability nonirrigated: 4e
Land capability irrigated: None specified
Ecological site name: Clay Loam 20-25" PZ
Ecological site number: R083CY446TX
Typical vegetation: Buffalograss, false Rhodes grass, pinhole bluestem, pink pappusgrass, plains bristlegrass, Arizona cottontop, curly-mesquite, other shrubs, other perennial forbs, other perennial grasses, Wright's threeawn

Use and Management

Major land uses: The major land uses of this soil are livestock grazing and wildlife habitat. Some areas are used for forage production.
Wildlife habitat: This soil is well suited to wildlife habitat. Deer, dove, javelina, and quail are common in areas of this soil.

Prime Farmland

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forest land, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. The slope ranges mainly from 0 to 5 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 182,900 acres in the survey area or nearly 25 percent of the total acreage meets the soil requirements for prime farmland. Prime farmland is located along the Nueces River in the eastern portion of the survey area and along San Miguel Creek leading into the Choke Canyon Reservoir. Most of the acreage is used predominantly for rangeland, with some areas used as improved pasture, and cultivated crops.

A trend in land use in some parts of the survey area has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units that make up the prime farmland in McMullen County are listed in table 5. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 6. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and forestland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Interpretive Ratings

The interpretive tables in this survey rate the soils in the survey area for various uses. Many of the tables identify the limitations that affect specified uses and indicate the severity of those limitations. The ratings in these tables are both descriptive and numerical.

Rating Class Terms

Rating classes are expressed in the tables in terms that indicate the extent to which the soils are limited by all of the soil features that affect a specified use or in terms that indicate the suitability of the soils for the use. Thus, the tables may show limitation classes or suitability classes. Terms for the limitation classes are *not limited, somewhat limited,* and *very limited*. The suitability ratings are expressed as *well suited, moderately suited, poorly suited,* and *unsuited* or as *good, fair,* and *poor*.

Numerical Ratings

Numerical ratings in the tables indicate the relative severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation.

Crops and Pasture

This section prepared by Bruce Henderson, Zone Conservation Agronomist, Corpus Christi

General management needed for crops and pasture is suggested in this section. The estimated yields of the main crops and pasture plants are listed; the system of land capability classification used by the Natural Resources Conservation Service is explained; and prime farmland is described.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Texas AgriLife Extension Service. According to resource data for McMullen County, approximately 38,000 acres in the survey area are used for crops and pasture. Of this total, according to the 2007 Texas Agricultural Statistics, a little over 4,000 acres were harvested as forage such as hay and silage.

The acreage being farmed according to the Texas Agricultural Statistics is decreasing annually. McMullen County has approximately 745,100 acres and annual harvested crops account for only about 0.5 percent of the overall total acreage and do not have a major impact on the agricultural economy.

Wind erosion is the major management concern on nearly all of the cropland because of the coarse textured surface layer of the soils. Water erosion is an additional concern in some areas where the slope is more than 2 percent. Loss of the surface layer through erosion is damaging for two reasons. First, productivity is reduced as the surface layer is lost and part of the subsoil is incorporated into the plow layer. Second, soil erosion on farmland results in sediment entering streams and watercourses. Controlling erosion minimizes the pollution of streams and lakes by sediment and improves the quality of water for livestock, fish, wildlife, and other recreational uses.

Residue management practices, such as conservation tillage and seasonal residue management helps to control erosion. Leaving crop residues on the surface helps to protect the soil against surface crusting, reduces wind erosion, the impacts of raindrops, and decreases the runoff rate. It also provides shade for the soil and thus reduces the soil temperature and evaporation rate. Crop residues increases organic matter, improves soil tilth, and minimizes compaction caused by farm machinery. Residues should be protected from overgrazing and/or burning. Using noninversion tillage equipment that leaves crop residue on the surface is very effective in controlling erosion and minimizing compaction. Wind strips also provide protection to watermelons for plant survival and to reduce wind erosion.

Parallel terraces are effective in controlling water erosion because they reduce the length of slopes. They are most practical in areas of deep and moderately deep soils that have a slope of more than 1 percent.

Field crops suited to the soils and climate of McMullen County include grain sorghum and forage sorghum. Forage sorghum is the most commonly grown annual forage crops.

Because raising beef cattle and hunting leases are the main agricultural enterprises, pasture management is also important. The trend for the past several years has been to convert land from other uses to pasture and hay. Introduced grasses and annual forages that respond to good management practices are generally planted. They are used mainly in combination with native range to provide year-round grazing. They are also used for supplemental grazing or haying.

Perennial grasses that are well adapted to the county include coastal bermudagrass, kleingrass, Wilman lovegrass, common buffelgrass, and Alamo switchgrass. Annual forage sorghum is also planted regularly.

Good management practices for pasture include fertilization, rotational grazing, weed control, and brush management. Good management practices for hay include applying fertilizer and cutting at the proper height and stage of plant growth to maintain plant vigor.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of map units in the survey area also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good-quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or Texas AgriLife Research can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forestland, or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit (USDA, 1961).

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have slight limitations that restrict their use.

Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or aesthetic purposes.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, 2e. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w, s,* or *c* because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, forestland, wildlife habitat, or recreation.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, 2e-4 and 3e-6. These units are not given in all soil surveys.

The capability classification of the soils in this survey area is provided in the section Detailed Soil Map Units, and in table 6.

Rangeland

Vivian Garcia, Zone Rangeland Management Specialist, Corpus Christi; and David Hinojosa, Ecological Site Inventory Specialist, Robstown, USDA Natural Resources Conservation Service, prepared this section.

Rangeland is the land on which the native vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. In areas that have similar climate and topography, the kind and amount of vegetation produced are closely related to the kind of soil. Effective management is based on the relationship of soils, vegetation, and water. Rangeland or native grassland receives no regular or frequent cultural treatment, such as fertilizer or tillage.

About 667,000 acres or 90 percent of McMullen County is rangeland. The rangeland in McMullen County is located within the three Major Land Resource Areas (MLRA); MLRA 83A—Northern Rio Grande Plains, MLRA 83B—Western Rio Grande Plains, and MLRA 83C—Central Rio Grande Plains of Texas. The soils are generally calcareous to neutral with loamy soils over loamy and clayey subsoils. The original vegetation grew predominantly on open grassland. It consisted of tall, mid, and short grasses interspersed with woody shrubs and some trees. The relatively abundant woody shrubs were suppressed by periodic fires, some of which were started by lightning and others by the Indian inhabitants of the area.

The vegetative community on the rangeland in the county has changed drastically during the last 200 years. The major factors in the change are fluctuating climatic conditions; continuous, heavy grazing by livestock; and the elimination of fire, both prescribed and wild. Woody plants have increased in abundance on much of the rangeland. The more productive grasses and forbs have been grazed out in some areas and replaced by a mixture of short grasses and annual forbs.

Forage production in areas of rangeland occurs primarily during two distinct growth periods. Most of the annual growth occurs in April, May, and June, when spring rains and moderate temperatures are most favorable to the growth of warm-season plants. A secondary growth period usually occurs in September and October, when fall rains and gradually cooling temperatures are common.

Rangeland Productivity

In areas that have similar climate and topography, differences in the kind and amount of vegetation produced on rangeland are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

Table 7 shows, for each soil that supports rangeland vegetation, the ecological site and the potential annual production of vegetation in favorable, normal, and unfavorable years. An explanation of the column headings in the table follows.

An *ecological site* is the product of all the environmental factors responsible for its development. It has characteristic soils that have developed over time throughout the soil development process; a characteristic hydrology, particularly infiltration and runoff, that has developed over time; and a characteristic plant community (kind and amount of vegetation). The hydrology of the site is influenced by development of the soil and plant community. The vegetation, soils, and hydrology are all interrelated. Each is influenced by the others and influences the development of the others. The plant community on an ecological site is typified by an association of species that differs from that of other ecological sites in the kind and/or proportion of species or in total production. Descriptions of ecological sites are available in the local offices of the Natural Resources Conservation Service or on the internet at http://www.nrcs.usda.gov/technical/efotg/.

Total dry-weight production is the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture. Yields are adjusted to a common percent of air-dry moisture content.

Range management requires a knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present range similarity index and rangeland trend. Range similiarity index is determined by comparing the present plant community with the potential natural plant community on a particular rangeland ecological site. The more closely the existing community resembles the potential community, the higher the range similarity index. Rangeland trend is defined as the direction of change in an existing plant community relative to the potential natural plant community. Further information about the range similarity index and rangeland trend is available in the “National Range and Pasture Handbook,” which is available on the internet at http://www.glti.nrcs.usda.gov or in local offices of the Natural Resources Conservation Service.

The objective in range management is to control grazing so that the plants growing on a site remain or improve to about the same in kind and amount as the climax plant community for that site. Such management generally results in the optimum production of vegetation, reduction of undesirable brush species, conservation of water, and control of erosion. Sometimes, however, a range condition somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

Good production of livestock and forage on rangeland is obtained primarily by managing the time of grazing and limiting the amount of forage removed. The green parts of plants manufacture food for growth and store part of it for use in regrowth and seed production.

A typical growth curve for MLRA's 83A, 83B, and 83C for rangeland in McMullen County is as follows:

Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1	2	3	7	20	30	15	5	10	4	2	1

Approximately 72 percent of the annual forage production occurs in the months April to July responding to spring and early summer rains. A second smaller growth period may occur in the fall if sufficient moisture is available.

A typical growth curve for McMullen County for small grains or winter grain is as follows:

Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
14	18	21	22	6	0	0	0	0	0	9	14

Approximately 75 percent of the annual grain production occurs in the months January to April responding to winter precipitation.

In areas that have similar climate and topography, differences in the kind and amount of vegetation produced on rangeland are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

Rangeland Management

Table 8, table 9, table 10, and table 11 provide information for rangeland and grazing management. Soils vary in their capacity to support various rangeland habitats and to produce desirable forage and carrying capacities. The use and management of soils for numerous rangeland practices is directly dependent on individual soil properties and characteristics and those required by the management practice. These interpretive ratings are designed to provide the user with information about presence of soil properties or characteristics that may limit their use and management for a specific rangeland practice. They also guide the user in predicting how the soil will respond to the management practice. The interpretive rating are for the soils in their natural condition and do not consider present land use, existing vegetation, and water sources. Site evaluation and planning, however, should consider these items.

Rangeland chaining is commonly practiced, sometimes in combination with seeding, for rangeland restoration. Chaining is implemented to reduce the composition of pinyon and juniper trees and sagebrush. Chaining also helps bury seed broadcast prior to chaining or between double chainings.

Chaining is often performed with an "Ely" chain or other similarly modified heavy chain dragged in a loose U-shaped or J-shaped pattern between two crawler-type tractors. The chaining interpretive ratings represent the relative physical limitations of soil factors upon use of implements suitable for chaining rangeland sites and the ability to obtain a favorable vegetative response to the treatment.

Soils that are rated *not limited* have no restrictions for chaining. A *somewhat limited* rating implies that the soil has features that may impede chaining. A *very limited* rating indicates that the soil characteristics are such that they limit or prohibit chaining.

Rangeland root plowing is commonly practiced in combination with seeding for rangeland restoration. Root plowing is used to reduce the composition of sagebrush, and to a lesser extent rabbitbrush, greasewood, and annual or perennial herbaceous plants that are considered undesirable. This treatment also helps prepare a seedbed for subsequent seeding operations.

Rangeland root plowing is usually performed with a plow that undercuts trees or brush. This practice can be used on almost all soils where slope gradient is not limiting for safety.

The rangeland root plowing interpretive ratings represent the relative physical limitations of soil factors upon use of a tractor and root-plow to remove trees and shrubs and, to a lesser extent, the ability to obtain a favorable vegetative response to subsequent seeding.

Soils that are rated *not limited* have no restrictions for root plowing. A *somewhat limited* rating implies that the soil has features that may impede root plowing. A *very limited* rating indicates that the soil characteristics are such that they limit or prohibit root plowing.

Steep slopes limit the ability to safely operate a root plow along the contour. Depth to bedrock determines the thickness of the plant growth medium and restricts the capability to do deep plowing. Stones and rock outcrop potentially damage and hinder the operation of the equipment. Ponding, flooding, and high water table affect the timing of tillage by limiting access to the site. High clay content reduces effectiveness of the tillage implements.

Rangeland disking is commonly practiced in combination with seeding for rangeland restoration. Plowing or disking is used to reduce the composition of sagebrush, and to a lesser extent rabbitbrush, greasewood, and annual or perennial herbaceous plants that are considered undesirable. This treatment also helps prepare a seedbed for subsequent seeding operations.

Rangeland plowing is usually performed with a brushland plow, wheatland-type (one-way disk) plow, or extra heavy-duty, offset disk plow. The brushland plow's rugged construction and independently spring-loaded disks allow it to be used on rough, moderately stony or rocky sites without undue breakage. The wheatland-type plow is best suited to gentle slopes that are relatively free of stones and rock outcrop. The extra heavy-duty, offset disk plow is well adapted to use on compact, heavy textured soils. The rangeland plowing/disking interpretive ratings represent the relative physical limitations of soil factors upon use of implements suitable for tilling rangeland sites and, to a lesser extent, the ability to obtain a favorable vegetative response to subsequent seeding.

Soils that are rated *not limited* have no restrictions for rangeland disking. A *somewhat limited* rating implies that the soil has features that may impede rangeland disking. A *very limited* rating indicates that the soil characteristics are such that they limit or prohibit rangeland disking.

Steep slopes limit the ability to safely operate a brushland, wheatland-type, or offset disk plow along the contour. Depth to bedrock determines the thickness of the plant growth medium and restricts the capability to do deep plowing. Stones and rock outcrop potentially damage and hinder the operation of the equipment. Ponding, flooding, and high water table affect the timing of tillage operations.

Rangeland roller chopping is commonly practiced, sometimes in combination with seeding, for rangeland restoration. Roller chopping is implemented to reduce the size and composition of oakbrush and other mountain shrubs, and young, smaller-sized, pinyon and juniper trees. Roller chopping may also help bury seed broadcast prior to or during treatment. Roller chopping is performed with a cylindrical roller or drum, equipped with several full-length cutting blades, that is towed behind a crawler-type tractor. Two roller choppers are sometimes towed in tandem and set at slightly contrasting angles.

Soils that are rated *not limited* have no restrictions for roller chopping. A *somewhat limited* rating implies that the soil has features that may impede roller chopping. A *very limited* rating indicates that the soil characteristics are such that they limit or prohibit roller chopping.

Steep slopes increase the power requirements for the equipment and limit the ability to safely perform the roller chopping operation. Stones and rock outcrop damage the blades of the roller chopper and make towing more difficult.

Rangeland dozing or grubbing is commonly practiced in combination with seeding for rangeland restoration. Dozing or grubbing is used to reduce the composition of woody species that are considered undesirable. This treatment also helps prepare a seedbed for subsequent seeding operations.

Rangeland dozing is usually performed with a crawler tractor and front mounted blade used to push down trees. Rangeland grubbing is usually performed with a crawler tractor using a stinger or chisel to undercut and lift the trees or brush out of the ground. The crawler tractor allows these practices to be used on almost all soils where slope gradient is not limiting for safety. These rangeland dozing or grubbing interpretive ratings represent the relative physical limitations of soil factors upon use of a crawler tractor and, to a lesser extent, the ability to obtain a favorable vegetative response to subsequent seeding.

Soils that are rated *not limited* have no restrictions for rangeland dozing or grubbing. A *somewhat limited* rating implies that the soil has features that may impede rangeland dozing or grubbing. A *very limited* rating indicates that the soil characteristics are such that they limit or prohibit rangeland dozing or grubbing.

Steep slopes limit the ability to safely operate a crawler tractor. Depth to bedrock determines the thickness of the plant growth medium and restricts the capability to do grub. Stones and rock outcrop potentially damage and hinder the operation of the equipment. Ponding, flooding, and a high water table affect the timing of tillage by limiting access to the site.

Rangeland prescribed burning is a restoration practice that is primarily designed to help return the natural fire cycle to the landscape. Properly carried out on suitable sites, burning can be a very effective and cost efficient treatment method to help restore the desired composition of plant species in an ecological site, improve livestock access on heavy brush or slash sites, rejuvenate sprouting browse species and stagnant grass plants, release nutrients into the soil, improve palatability and nutrient content of forage, reduce fuel loading, and prepare an ash seedbed for artificial or natural seeding. Burning may be combined with mechanical or chemical rangeland treatments.

Fuel ignition can be natural or artificial using hand-held drip torches, aerial ignition, and other methods. Fire lines can be natural fuel breaks, wet-line techniques, hand constructed, or machinery constructed.

The prescribed burning interpretive ratings represent the relative limitations of soil and physiographic factors upon the ability to safely contain the fire, soil and climatic factors upon the ability to obtain a favorable vegetative response to the treatment, and risk of water and wind erosion prior to reestablishing adequate watershed cover on the treatment site.

Prescribed burning should be carefully planned and executed. It should be carried out following a well designed prescription and burn plan under the supervision of a qualified prescribed burning team. Burning objectives should be clearly defined and should be evaluated during post-burn assessments. Minimizing risks to human health, safety, and property damage and containment of the burn are of paramount importance. Fire mortality susceptibility of desirable plants also needs to be taken into consideration during prescribed burning planning.

Soils that are rated *not limited* have no restrictions for prescribed burning. A *somewhat limited* rating implies that the soil has features that may impede prescribed burning. A *very limited* rating indicates that the soil characteristics are such that they limit or prohibit prescribed burning.

Low precipitation, steep slopes, low available water capacity, water erosion, and wind erosion reduce the probability of re-establishing rangeland vegetation.

Mechanical seeding is commonly practiced in combination with vegetation control techniques to revegetate depleted rangeland. Rangeland planting may be accomplished using a rangeland drill, broadcast seeding aerially, transplanting, or with ground equipment.

The mechanical seeding interpretive ratings represent the relative physical limitations of soil factors upon use of a rangeland drill and the effects of soil and climatic factors upon the probability of establishing a successful planting.

A *not limited* rating indicates that a successful planting can be expected in 8 or more years out of 10. A wide variety of grass, forb, and shrub species are well adapted to seeding on that site and a high potential forage production level can be anticipated. The benefit and cost ratios are favorable and these sites should be given primary consideration for rangeland restoration seeding.

A *somewhat limited* rating indicates that a successful planting can be anticipated in 4 to 7 years out of 10. A limited number of plant species are adapted to seeding on the site and a moderate potential forage production level can be achieved. Some limitations for machinery used in seedbed preparation and planting may occur. Benefit and cost ratios are somewhat reduced to severe, but some may still be favorable. These soils should be given secondary consideration for rangeland restoration seeding.

A *very limited* rating indicates that a successful planting can be achieved in 3 or fewer years out of 10. Only the plant species adapted to the most rigorous environmental conditions, as indicated by the restrictive features can be seeded. Low or very low forage production levels can be anticipated. Equipment limitations may be severe and expensive site preparation may be necessary. Benefit and cost ratios will be very poor. It is recommended that these sites only be seeded for emergency watershed protection; they may even be marginal for this purpose.

Rock fragments and rock outcrop potentially damage the rangeland drill. Steep slopes limit the ability to safely operate a rangeland drill along the contour. High clay content reduces the effectiveness of the rangeland drill and ability to operate equipment during wet soil conditions.

Extremely sandy surface textures reduce the effectiveness of the rangeland drill. Ponding, flooding, and high water table the timing of rangeland drill seeding by limiting access to the treatment area.

Low precipitation, permafrost, shallow rooting depth, extremely sandy surface textures, low available water capacity, abrupt textural boundary, excess salt, excess sodium, acid soils, and soil blowing reduce the probability of establishing a successful planting.

Ranch access roads ratings apply to rubber tired vehicles, walking, horseback riding, and similar uses that require minimal cutting or filling. The soils are rated based on the properties and qualities that influence trafficability and erodibility. Many soil survey areas in sparsely populated parts of the country have soil surveys of lower intensity. While some general observations may be made, onsite evaluation is required before the final site is selected. Soils that are rated *not limited* have no restrictions for ranch access roads. A *somewhat limited* rating implies that the soil has features that may impede construction and maintenance of ranch access roads. A *very limited* rating indicates that the soil characteristics are such that they limit or prohibit the construction or maintenance of ranch access roads.

Soil properties and qualities considered in rating the degree of limitation are those that influence the ease of building access roads and the performance of access roads after development. Stoniness, wetness, texture of the surface layer, slope, flooding, erodibility, and, in dry regions, dustiness are the main concerns in developing access roads. For good trafficability, the surface of a path or trail should absorb rainfall readily, remain firm under heavy traffic, and not be dusty when dry.

Shallow excavations for plastic water pipelines are installed using narrow, shallow trenches at a maximum depth of 2 feet. The excavations are most commonly made by trenching machines or plows. Soil properties influence the development of construction sites, including the selection of the site, the design of the structure, construction, performance, and after construction maintenance. The soil interpretations for livestock watering pipelines are used as a tool in evaluating soil suitability and identifying soil limitations for the practice. The rating is for soils in their present condition and does not consider present land use. Soils that are rated *not limited* have no restrictions for pipeline installation. A *somewhat limited* rating implies that the soil has features that may impede pipeline installation. A *very limited* rating indicates that the soil characteristics are such that they limit or prohibit pipeline installation.

Ratings are based on the soil properties that influence ease of digging and resistance to sloughing. Depth to bedrock or cemented pan, hardness of bedrock or a cemented pan, and the amount of large stones influence the ease of digging, filling, and compacting. Depth to the seasonal high water table and flooding may restrict the period when pipeline can be installed. Slope influences the ease of using machinery. Soil texture and depth to water table influence the resistance to sloughing.

Fencing is the construction and maintenance of barriers for the management of animals and people. Fences are constructed using metal or wooden posts. This interpretation was developed for conditions where the posts are set to a depth of 2 feet or less into the soil with strands of wire suspended between the posts. This interpretation is used to rate the ease of setting posts, maintaining the wire tension, and estimating the replacement and maintenance cost. Excavations for wooden posts are made by power auger or hand dug, metal posts are driven into the soil.

Fencing, post depth (less than 24 inches) is of a general nature and identifies soil features that may restrict the installation of fence posts to a depth of 24 inches. It is designed to be used in the planning process to identify areas of concern prior to installing fencing. Soil features that may impede digging, setting, and maintenance of fencing are identified and guide the user in fence design, construction, and maintenance considerations. Soils that are rated *not limited* have no restrictions for setting fence posts within a depth of 24 inches. A *somewhat limited* rating implies that the soil has features within a depth of 24 inches that may impede digging or setting fence posts or fence maintenance. A *very limited* rating indicates that the soil characteristics within a depth of 24 inches are such that they limit fence post digging or setting or fence maintenance.

Bedrock, cemented pan, and large and small stones influence the excavation of post holes and the driving of posts. Flooding and depth to a seasonal high water table may restrict the season of construction. Flooding also affects maintenance and replacement cost. High water tables raise the maintenance cost and require deeper post settings. High shrink-swell soils require deep post settings or rock jacks to maintain vertical post alignment. Post alignment and maintaining the desired wire tension are often difficult on sandy soils because of their low strength. Soil blowing causes maintenance problems. Frost action results in frost-heaving of the posts. Steep slopes affect the use power augers and the delivery of supplies. During the wet seasons, surface creep on steep slopes may increase maintenance cost. Soil reaction and salinity affect the type of post selected and maintenance costs.

Fencing is the construction and maintenance of barriers for the management of animals and people. Fences are constructed using metal or wooden posts. This interpretation was developed for conditions where the posts are set to a depth of 3 feet or less into the soil with strands of wire suspended between the posts. This interpretation is used to rate the ease of setting posts, maintaining the wire tension, and estimating the replacement and maintenance cost. Excavations for wooden posts are made by power auger or hand dug, metal posts are driven into the soil.

Fencing, post depth (less than 36 inches) is of a general nature and identifies soil features that may restrict the installation of fence posts to a depth of 36 inches. It is designed to be used in the planning process to identify areas of concern prior to installing fencing. Soil features that may impede digging, setting, and maintenance of fencing are identified and guide the user in fence design, construction, and maintenance considerations. Soils that are rated *not limited* have no restrictions for setting fence posts within a depth of 24 inches. A *somewhat limited* rating implies that the soil has features within a depth of 36 inches that may impede digging or setting fence posts or fence maintenance. A *very limited* rating indicates that the soil characteristics within a depth of 36 inches are such that they limit fence post digging or setting or fence maintenance.

Bedrock, cemented pan, and large and small stones influence the excavation of post holes and the driving of posts. Flooding and depth to a seasonal high water table may restrict the season of construction. Flooding also affects maintenance and replacement cost. High water tables raise the maintenance cost and require deeper post settings. High shrink-swell soils require deep post settings or rock jacks to maintain vertical post alignment. Post alignment and maintaining the desired wire tension are often difficult on sandy soils because of their low strength. Soil blowing causes maintenance problems. Frost action results in frost-heaving of the posts. Steep slopes affect the use power augers and the delivery of supplies. During the wet seasons surface creep on steep slopes increases maintenance costs. Soil reaction and salinity affect the type of post selected and maintenance costs.

Ecological Sites

The following section describes each ecological site in McMullen County. The potential plant community is described as well as the site's response to heavy, continuous grazing. For additional detail on the soils in each ecological site, refer to the Detailed Soil Map Units section. Information on rangeland forage yields for each soil can be found in table 7.

McMullen County is composed of three Major Land Resource Areas: MLRA 83A—Northern Rio Grande Plain; MLRA 83B—Western Rio Grande Plain; and MLRA 83C—Central Rio Grande Plain. A total of 34 ecological sites occur in the county, each being assigned to a particular MLRA. Descriptions of ecological sites are available on line at http://essis.sc.gov.usda.gov or in the local offices of the Natural Resource Conservation Service.

MLRA 83A—Northern Rio Grande Plain

Clay Loam 20 to 35” PZ

This group includes soil mapping units: BkB—Bookout clay loam, 0 to 2 percent slopes; and the Clareville part of CZB—Czar-Clareville soils, 0 to 2 percent, rarely flooded.

The site occurs on stream terraces with slopes usually less than 3 percent. The soils are very deep with a silty clay loam, clay loam, or sandy clay loam surface and clayey subsoils. Permeability of the subsoil is slow to moderate. The water holding capacity and production potential on this site is high.

The historic climax plant community is that of open grassland with some scattered mesquite trees and woody shrubs. The brush canopy has been kept at a low level by periodic widespread range fires. The composition by weight is 90 percent grasses, 5 percent forbs, and 5 percent woody plants. This site is found in both MLRA 83A and MLRA 83C. Production is higher in MLRA 83A because of the higher rainfall amount received.

The dominant plants consist of 40 percent plains lovegrass, two-flower and four-flower trichloris, Arizona cottontop, pinhole bluestem, and plains bristlegrass; 20 percent buffalograss, curly-mesquite, and hooded windmillgrass; 15 percent pink pappusgrass; 15 percent Texas wintergrass, lovegrass tridens, white tridens, and perennial threeawn; 5 percent forbs such as bushsunflower, orange zexmenia, and bundleflower; and 5 percent woody plants, such as mesquite, condalia, spiny hackberry, guayacan, and pricklypear.

Range deterioration occurs as a result of heavy and continuous grazing. As deterioration of the climax plant community progresses, two-flower and four-flower trichloris, Arizona cottontop, lovegrass tridens, plains bristlegrass, and many palatable perennial forbs are the first plants to be grazed out. They are replaced initially by woody plants such as mesquite, blackbrush, whitebrush, and by grasses such as curly-mesquite. If overgrazing continues, the site is dominated by a wide array of woody plants and by an understory of short grasses such as red grama, perennial threeawn, curly-mesquite, and Hall’s panicum.

Clayey Bottomland 20 to 35” PZ

This group includes soil mapping units: BuA—Buchel clay, 0 to 1 percent slopes, occasionally flooded, and BzA—Buchel clay, 0 to 1 percent slopes, frequently flooded (fig. 12).

This site occurs on flood plains and low terraces of old flood plains that receive overflow about 50 times in 100 years in the frequently flooded units and 5 to 50 times in 100 years in the occasionally flooded units. The soils are deep, calcareous or neutral clayey soils throughout. The soils crack when dry and have a high shrink-swell potential. The soils are well drained to somewhat poorly drained, runoff is low and the permeability is slow to very slow. Water holding capacity is high but available water for plant use is medium because of tight capillary pull of the clay minerals. These soils are on alluvial flood plains, and the natural fertility is high.

The historic climax plant community was a mixed grass savannah that could be further characterized as a hardwood savannah. Hardwood trees like oaks, elm, hackberry, cottonwood, palmetto, and pecan are typical and become more prevalent immediately adjacent to streams. The plant communities on this site are highly productive because of the natural fertility of the alluvial soils.

The community is dominated by tall and mid grasses such as four-flower trichloris, little bluestem, Indiangrass, southwestern bristlegrasss, Virginia wildrye, and switchgrass. Other grass species commonly found on the site include knotroot bristlegrass, white tridens, and buffalograss.

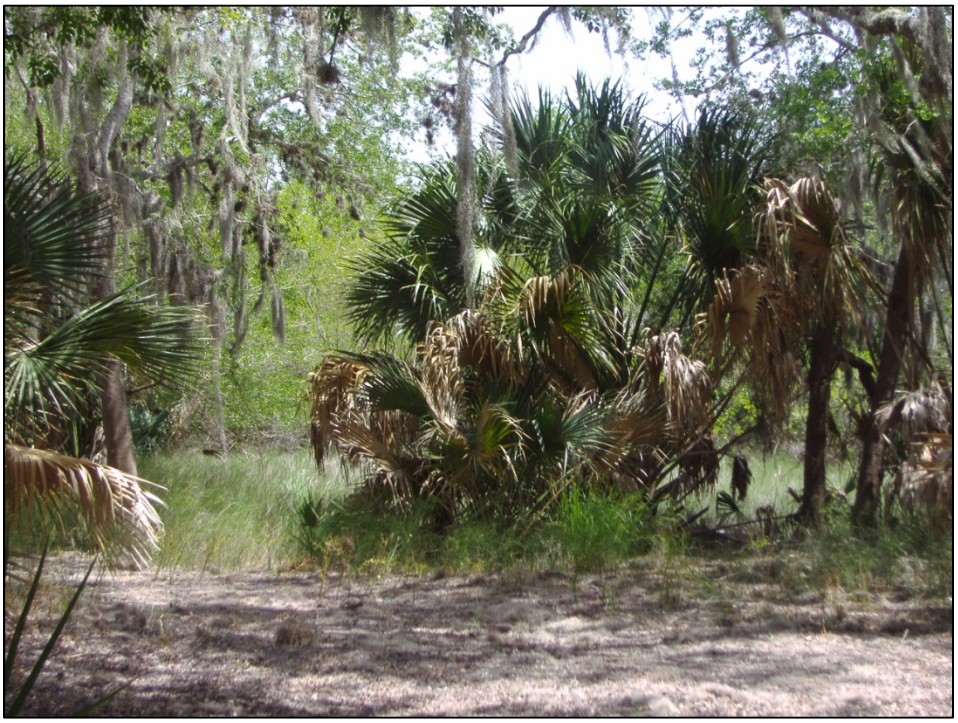

Figure 12.—An area of Buchel clay, 0 to 1 percent slopes, frequently flooded. Buchel soils are in the Clayey Bottomland 20 to 35” PZ ecological site (MLRA 83A—Northern Rio Grande Plain). Vegetation consists of Sabal, known locally as a Palmetto, which can be found along the Nueces River in eastern McMullen County.

The climax community supported a variety of forbs including Engelmann daisy, giant ragweed, yellow neptunia, and sensitive briar. The woody component of this ecological site is predominantly hardwood trees which provide about 25 percent canopy cover with an understory of greenbriar, grapes, and berry vines.

Grasses account for about 85 percent of the total annual production, forbs 5 percent and Woody species 10 percent.

As retrogression occurs, because of heavy continuous grazing or lack of fire and brush management, trees and shrubs often increase to form a dense canopy. This will cause an increase of shade tolerant grasses and a decrease in herbaceous plant production. In a deteriorated condition many of the following invaders may be seen growing on the site: bushy bluestem, western ragweed, bitter sneezeweed, frogfruit, sumpweed, and annual grasses.

Claypan Prairie 20 to 25” PZ

This group includes soil mapping unit: LaB—Laparita clay loam, 0 to 3 percent slopes, rarely flooded.

This site occurs on lower lying areas along drainageways and on stream terraces with slopes less than 3 percent. This soil is very deep and saline, and has low available water capacity. This soil has a high content of sodium. Consequently, the soil has poor structure, which impedes the movement of air, moisture, and roots through the soil.

The historic climax plant community is that of semi-open grassland supporting a scattered canopy of brush. The brush has been kept at a low level by unfavorable soil characteristics and by periodic range fires.

The dominant plants consist of 40 percent pink pappusgrass, plains bristlegrass, sand dropseed, hooded windmillgrass, and pinhole bluestem; 10 percent is two-flower and four-flower trichloris, lovegrass tridens, and Arizona cottontop; 10 percent is vine-mesquite and white tridens; 15 percent is buffalograss and curly-mesquite; 5 percent is whorled dropseed; 10 percent is fall witchgrass; slim tridens, and Texas bristlegrass; and 5 percent are forbs including bundleflower, bushsunflower, orange zexmenia, ruellia, and other forbs. Woody plants such as mesquite, whitebrush, huisache, pricklypear, tasajillo, allthorn, lotebush, granjeno, Berlandier wolfberry, and screwbean make up about 5 percent of the historic climax plant community.

As the range condition deteriorates from heavy and continuous grazing, two-flower and four-flower trichloris, Arizona cottontop, lovegrass tridens, and the most palatable forms decrease and are eventually grazed out of the plant community. These plants are replaced by pink pappusgrass, plains bristlegrass, curly-mesquite, hooded windmillgrass, and less palatable forbs and brush.

With continued heavy use of the range and further deterioration, the understory vegetation is dominated by whorled dropseed, red grama, red lovegrass, perennial threeawn, and unpalatable forbs. Goldenweed may dominate the plant community at this stage. Continued heavy use and no periodic range fires result in a moderate canopy of brush.

Gravelly Ridge 20 to 35” PZ

This group includes soil mapping unit: HnC—Hindes very gravelly sandy clay loam, 1 to 5 percent slopes. (fig. 13)

This site occurs on gently undulating paleoterraces. Slope ranges from 1 to 30 percent but the average slope is less than 10 percent. This soil is very shallow to very deep, noncalcareous and calcareous. The soils have gravelly to extremely gravelly clayey textures and are underlain by indurated to weakly cemented caliche. The soils are well drained, runoff is medium and permeability is moderate. It absorbs rainfall readily and has a very low available water capacity.

This site occurs on uplands with slopes ranging from 1 to 5 percent. The soils are shallow to very deep, noncalcareous and calcareous gravelly loams. Shallow soils are generally underlain by indurated caliche. The deep and very deep soils have clayey and gravelly clay subsoils that can also be underlain by caliche. The soils are well drained with medium to high runoff and have a moderate permeability. Because of the shallow depth of the gravel, this site is somewhat droughty.

The historic climax plant community is that of an open grassland interspersed with a variety of scattered woody shrubs and perennial forbs. The composition by weight is about 85 percent grasses, 5 percent forbs, and 10 percent woody plants.

The dominant plants consist of 60 percent tanglehead, green sprangletop, pinhole bluestem, plains bristlegrass, plains lovegrass, two-flower trichloris, Arizona cottontop, lovegrass tridens, sideoats grama, Neally grama, and pink pappusgrass; 20 percent reverchon panicum, fall witchgrass, slim tridens, hooded windmillgrass, hairy grama, and perennial threeawn; 5 percent buffalograss and curly-mesquite; 5 percent forbs such as bushsunflower, orange zexmenia, menodora, and bundleflower; 10 percent woody plants such as guajillo; blackbrush, range ratany, false mesquite, vine ephedra, guayacan, desert yaupon, littleleaf sumac, Texas colubrina, feather dalea, and cenizo.

Green sprangletop, plains lovegrass, pinhole bluestem, plains bristlegrass, and bushsunflower are preferred by livestock and thus are grazed out under continuous, heavy grazing by livestock. They are replaced by plants such as fall witchgrass, slim tridens, and reverchon panicum and by woody shrubs. If overgrazing continues, the site is dominated by woody plants, such as blackbrush, guajillo, littleleaf sumac, shrubby blue sage, and cenizo, and by an understory of short grasses, such as red grama, hairy tridens, perennial threeawn, Hall’s panicum, and annual forbs and grasses.

Loamy Bottomland 25 to 35” PZ

This group includes soil mapping units: ZaB—Zavala fine sandy loam, 0 to 2 percent slopes, flooded.

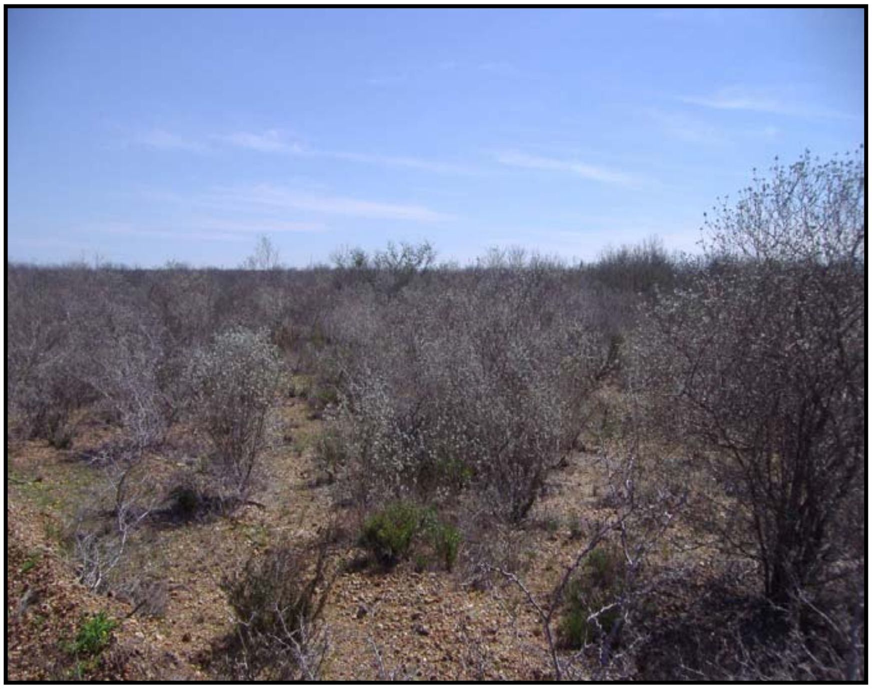

Figure 13.—Rangeland on an area of Hindes very gravelly sandy clay loam, 1 to 5 percent slopes. Because of the low rainfall and low available water capacity, shrubby vegetation persists on this map unit. Hindes soils are in the Gravelly Ridge 20 to 35” PZ ecological site (MLRA 83A—Northern Rio Grande Plain).

This site occurs on low stream terraces and on flood plains along drainageways. The site is subject to frequent and occasional flooding. Slope ranges from 0 to 2 percent. The soils are noncalcareous and calcareous loamy sediments. The soils are well drained, runoff is low, and permeability is moderately rapid. The soils have a medium to high water holding capacity. This site has potential to favor high yields of good quality forage because of that it is in a water receiving position and it is naturally fertile soil because of nutrient rich sediment that is associated recent alluvial deposits.

The historic climax plant community varies according to landscape position. It is a mixture of trees, shrubs, grasses, and forbs. The composition, by weight, is about 80 percent grasses, 5 percent forbs, and 15 percent woody plants. The frequency and amount of overflow also have an influence on the plant community make up.

The dominant plants consist of 40 percent four-flower trichloris, southwestern bristlegrass, big cenchrus, big sacaton, and switchgrass; 15 percent white tridens, vine-mesquite, and pink pappusgrass; 15 percent buffalograss, plains bristlegrass, and sedges; 10 percent Texas wintergrass and Virginia wildrye; 5 percent forbs such as bundleflower, ruellia, and sensitive-briar; and 15 percent woody plants, such as hackberry, pecan, elm, willow, live oak, and mesquite.

Deterioration of the historic climax plant community occurs if the site is subjected to heavy and continuous grazing and the absence of fire. The taller grasses such as four-flower trichloris, switchgrass, big cenchrus, southwestern bristlegrass, and big sacaton decrease in abundance. They are replaced initially by plants such as sedges, buffalograss, hooded windmillgrass, fall witchgrass and a diversity of woody plants. If overgrazing continues, the woody plants such as mesquite, spiny hackberry, whitebrush, and huisache continue to invade and increase in abundance and dominate an understory of sedges, red threeawn, Hall’s panicum, filly panicum, bermudagrass, tumble windmillgrass, and annual grasses and forbs.

Rolling Blackland 25 to 35” PZ

This group includes soil mapping units: EsB—Eloso clay, 0 to 3 percent slopes; RoB—Rosenbrock clay, 1 to 3 percent slopes; and ToB—Tordia clay, 0 to 3 percent slopes.

This site is on uplands with slopes ranging from 0 to 3 percent. The soils of this site are moderately deep, gray, heavy clays and clay loams that often crack when dry. These soils absorb water slowly, and although fertility and water storage capacity are high, the percent of water available to plants is low.

The historic climax plant community was an open prairie dominated by mid and short grasses with very few trees or woody species. The plant communities on this site can be very productive because of naturally high fertility and water storage capacity but a limiting factor to forage production is low plant available water. The soils on this site are moderately deep, heavy clays and clay loams that often crack when dry. Water infiltration is slow when cracks are absent and as a result this site has a high runoff and erosion potential.

This community is dominated by grasses such as alkali sacaton, Arizona cottontop, lovegrass tridens, two- and four-flower trichloris, sideoats grama, curly-mesquite, and buffalograss. Texas wintergrass can also be an important cool season component during the Fall and Spring.

Forbs can be abundant on this site when there is adequate moisture and will include Maximillian sunflower, gayfeather, bundleflower, orange zexmenia, bushsunflower, and annual forbs. Woody species are uncommon in the climax plant community, but will include granjeno and various condalia and acacia species.

Grasses account for 95 percent of total annual production, forbs 5 percent and woody species are only present in trace amounts.

As retrogression occurs, because of heavy continuous grazing or lack of fire and brush management, Texas wintergrass, Plains bristlegrass, and buffalograss will increase. If the site continues to deteriorate grasses such as red grama, threeawn, tumble windmillgrass, and Texas grama will invade the site. Mesquite, granjeno, whitebrush, agarito, and pricklypear cactus will invade and continue to dominate the site as retrogression continues.

Saline Clay Loam 22 to 35” PZ

This group includes soil mapping unit: CbB—Campbellton clay loam, 1 to 3 percent slopes.

This site is on upland areas, with slopes generally ranging from 1 to 3 percent. Soils which characterize this site are very deep clay loams or sandy clay loams with calcareous subsoils. The soils are moderately to strongly saline in the subsoil with streaks or pockets of gypsum and other salts. Rainfall intake is slow, and runoff is medium to rapid. Available water capacity is low to medium because of salinity of the subsoils.

The historic plant community consists of mid and short grasses interspersed with a few woody plants. The brush canopies have been kept relatively open by periodic widespread range fires. The composition by weight is about 90 percent grasses, 5 percent forbs, and 5 percent woody plants.

The dominant plants consist of 35 percent white tridens, vine-mesquite, and pink pappusgrass; 15 percent two-flower trichloris; 15 percent plains bristlegrass, Arizona cottontop, and bristle panicum; 15 percent buffalograss and curly-mesquite; 10 percent fall witchgrass, Hall’s panicum, and perennial threeawn; 5 percent forbs, such as bundleflower, bushsunflower, and orange zexmenia; and 5 percent woody plants, such as guajillo, blackbrush, spiny hackberry, mesquite, guayacan, condalia, pricklypear, and desert yaupon.

Trichloris, vine-mesquite, and bushsunflower are grazed out under continuous, heavy grazing by livestock. They are replaced initially by plants such as curly-mesquite and Hall’s panicum and by woody plants. If overgrazing continues, woody plants continue to invade and increase in abundance. Blackbrush, other brush species, broomweed, and goldenweed form a dense canopy. The site is slow to recover after the herbaceous cover is removed as the soil will crust and retard rainfall intake and seedling establishment.

Sandy 20 to 35” PZ

This group includes soil mapping unit: RNB—Rhymes-Nusil complex, 1 to 3 percent slopes. (fig. 14)

These soils are very deep. They absorb rainfall readily and have a medium available water capacity.

The historic climax plant community on this site is open grassland that supports only occasional motts of brush. Periodic range fires have been a major factor in keeping this site open. The composition by weight is about 90 percent grasses, 5 percent forbs, and 5 percent woody plants.

About 55 percent of the climax plant community is seacoast bluestem. About 10 percent is crinkleawn; 5 percent is tanglehead; 5 percent is brownseed paspalum; 5 percent is thin paspalum; 5 percent is balsamscale, sand dropseed, and perennial threeawn; 5 percent is fall witchgrass; and 5 percent is hooded windmillgrass and knotroot bristlegrass. Perennial and annual forbs make up about 5 percent of the climax vegetation. They include snoutbean, western indigo, sensitive-briar, dalea, neptunia, partridge pea, croton, snakecotton, cardinal feather, and horsemint.

Shrubs and trees such as mesquite, catclaw, lantana, brazil, and pricklypear compose an insignificant amount of the production of the historic climax plant community.

If retrogression occurs as a result of heavy grazing, seacoast bluestem, switchgrass, crinkleawn, and snoutbean are replaced by brownseed paspalum, thin paspalum, balsamscale, Wright threeawn, croton, and partridge pea.

Eventually, with continuous and heavy grazing by livestock, the site becomes dominated by plants such as red lovegrass, grassbur, thin paspalum, tumble lovegrass,

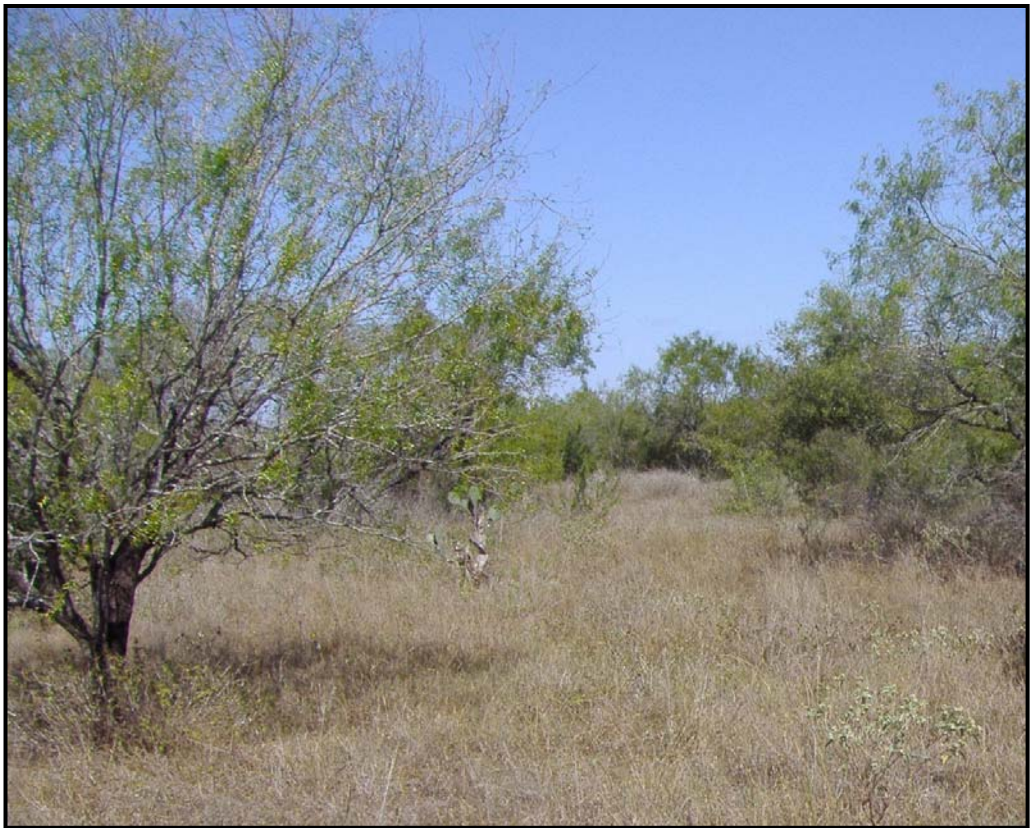

Figure 14.—Rangeland in an area of Rhymes-Nusil complex, 1 to 3 percent slopes. The vegetation includes mesquite, prickly pear, croton, granjeno, pink pappusgrass, buffelgrass, and plains bristlegrass. This map unit is in the Sandy 20 to 35" PZ ecological site (MLRA 83A—Northern Rio Grande Plain).

hairy grama, camphorweed, croton, horsemint, and many other perennial and annual forbs. The proportion of the brush species also increases on this degraded site.

At this stage of range deterioration, much of the ground is bare, leaving the soil susceptible to wind erosion.

Sandy Loam 25 to 35" PZ

This group includes soil mapping units: CnB—Colmena fine sandy loam, 0 to 3 percent slopes; and the Czar part of CZB—Czar-Clareville complex, 0 to 2 percent slopes, rarely flooded.

This site occurs on upland areas with slopes ranging from 0 to 3 percent. These soils are very deep with noncalcareous fine sandy loam surfaces. The soils are well drained, runoff is medium, and permeability is moderate. They absorb rainfall readily and have a high available water capacity, making this a highly productive site.

The historic climax vegetation grows on open grassland interspersed with a variety of mixed-brush and forbs. The brush has been kept at the same level by periodic, widespread range fires. The composition by weight is about 90 percent grasses, 5 percent woody plants, and 5 percent forbs.

About 30 percent of the climax vegetation is four-flower trichloris and tanglehead; about 20 percent is Arizona cottontop, lovegrass tridens, southwestern bristlegrass, and silver bluestem; 10 percent is plains bristlegrass and slender grama; 10 percent is hooded windmillgrass and sand dropseed; and 10 percent is pink pappusgrass. The remaining 10 percent of grasses include slim tridens, Texas bristlegrass, knotroot bristlegrass, perennial threeawn, fall witchgrass, gummy lovegrass, hairy grama, and thin paspalum. About 5 percent is forbs, including western indigo, sensitive-briar, bundle flower, milkpea, dalea, neptunia, roundleaf tephrosia, dayflower, orange zexmenia, bushsunflower, and some annual forbs.

Woody plants, including mesquite, brazil, granjeno, huisache, prickly-ash, whitebrush, catclaw acacia, lotebush, pricklypear, littleleaf sumac, Berlandier wolfberry, desert yaupon, guayacan, narrow-leaf elbowbush, Texas kidneywood, Texas persimmon, and ephedra, make up the remaining 5 percent of species composition.

As the range deteriorates from heavy and continuous grazing, four-flower trichloris, tanglehead, Arizona cottontop, southwestern bristlegrass, lovegrass tridens, and many palatable perennial forbs decrease and are eventually grazed out of the plant community. These plants are initially replaced by plains bristlegrass, slender grama, hooded windmillgrass, sand dropseed, and pink pappusgrass.

Eventually, with continued heavy use of the range and further deterioration, the understory consists mainly of annual forbs, such as sunflower and cowpen daisy, unpalatable perennial forbs, red lovegrass, red grama, Hall’s panicum, grassbur, Texas bristlegrass, and goldenweed. Continuous overgrazing and a lack of periodic range fires result in a dense canopy of mesquite and other climax brush species, along with an increase of goldenweed.

At this stage of range deterioration, significantly large areas are bare, and the soil begins to crust. Because of the crusting, less water is absorbed by the soil and more water runs off the soil. Thus, there is an increased hazard of erosion.

Shallow 25 to 35” PZ

This group includes soil mapping units: FaC—Fashing clay, 1 to 5 percent slopes; WgC—Weigang fine sandy loam, 1 to 5 percent slopes; and the Whitsett part of WPD—Whitsett-Picosa complex, 1 to 8 percent slopes.

This site usually occurs on plains which occupy slightly higher elevations than surrounding deeper soils and can have slopes ranging from 1 to 8 percent. The soils which characterize this site are shallow loamy and clayey soils which have formed over caliche, mudstone, sandstone, or calcareous materials. Erosion potential is low where adequate ground cover is maintained but soil erosion will increase as slope increases or as denuded conditions become prevalent.

The historical climax plant community was an open grassland with occasional scattered woody shrubs and perennial forbs. This site is dominated by mid and short grasses which are relatively limited in production reflecting a droughty site with a low available water holding capacity.

This community is dominated by feathery bluestem, sideoats grama, pink pappusgrass, Texas cupgrass, little bluestem, Arizona cottontop, tanglehead, and vine-mesquite. Short grasses such as plains bristlegrass, buffalograss, curly-mesquite, slim tridens, and hooded windmillgrass can also be found on this site.

Forbs do not make up a major component of the plant community on this site but common ones include orange zexmenia, bushsunflower, prairie acacia, Engelmann daisy, bundleflower, sensitivebriar, and annual forbs. This site supports a diverse woody component which includes Guajillo, Guayacan, Kidneywood, Blackbrush, desert yaupon, granjeno, and vine ephedra.

Grasses account for 85 percent of the total annual production, forbs 5 percent, and woody species 10 percent.

As retrogression occurs, because of heavy continuous grazing or lack of fire and brush management, grasses like red grama, threeawn, Hall’s panicum, and hairy tridens will increase. Woody species like granjeno, guajillo, blackbrush, and mesquite will increase in number and dominate this site. In a denuded state the bare ground crusts over causing an increase in potential erosion and reduced water infiltration as well as inhibiting seedling growth.

Shallow Ridge 20 to 32” PZ

This group includes soil mapping units: PkC—Pavelek clay loam, 3 to 5 percent slopes, severely eroded; and the Picosa part of WPD—Whitsett-Picosa complex, 1 to 8 percent slopes.

This site is found on ridges and cuestas with slopes ranging from 1 to 15 percent, but more commonly found between 1 to 5 percent slopes. The soils are shallow to caliche or bedrock. The available water holding capacity is low because of the depth of the soil and the skeletal nature of the profiles. Permeability is moderate to moderately slow.

The historic climax plant community is grassland with scattered low growing brush such as guajillo, elbowbush, mescal bean, vine ephedra, and Texas Kidneywood. The composition by weight is 80 percent grasses, 10 percent forbs, 5 percent shrubs, and 5 percent trees.

The historic climax plant community is dominated by mid grasses including Arizona cottontop, pinhole bluestem, plains bristlegrass, and sideoats grama. Taller grasses including trichloris and little bluestem also occur. Other important plants include awnless bushsunflower, Engelmann daisy, and orange zexmenia.

Heavy continuous overgrazing by cattle reduces the decrease plants including trichloris and little bluestem, plains bristlegrass, sideoats grama, and awnless bushsunflower. Increasers including pinhole bluestem, curly-mesquite, and sand dropseed replace them. As retrogression continues, tumble windmillgrass, red grama, Texas grama, threeawn, cenizo, brazil, and acacia species invade the site.

Tight Sandy Loam 20 to 25” PZ

This group includes soil mapping units: FoB—Floresville fine sandy loam, 0 to 3 percent slopes; ImB—Imogene fine sandy loam, 0 to 2 percent slopes, occasionally flooded; and WbB—Webb very fine sandy loam, 1 to 3 percent slopes.

This site occurs on upland areas. The soils are very deep with fine sandy loam surfaces and slowly permeable sandy clay loam and sandy clay subsoils. The soils are well drained, and runoff is medium to slow. This site tends to be droughty because of rapid permeability in the fine sandy loam surface which ranges from 8 to 16 inches thick, but greens up rapidly after small rains.

The historic climax plant community was an open grassland dominated by midgrasses with scattered mesquite, and other woody species. This community is dominated by grasses such as little bluestem, two- and four-flower trichloris, pink pappusgrass, Arizona cottontop, tanglehead, feathery bluestem, and hooded windmillgrass. Short grasses such as buffalograss, curly-mesquite, threeawn, and slender grama can also be found.

Forbs and legumes grow well on this site and include bushsunflower, Engelmann daisy, orange zexmenia, and annual forbs. The woody shrub community includes Texas kidneywood, wine-ephedra, mesquite, and granjeno.

Grasses account for 90 percent of total annual production, forbs 5 percent, and woody species 5 percent.

As retrogression occurs, because of heavy continuous grazing or lack of fire and brush management, woody species like mesquite, granjeno, lime prickly ash, and Texas kidneywood and other woody species will start to dominate and will form a moderate to dense canopy. Other common species that will invade this site include croton, cactus, red grama, Texas grama, threeawn, lantana, and sandbur.

MLRA 83B—Western Rio Grande Plain

Clay Flat 18 to 25” PZ

This group includes soil mapping unit: MtB—Montell clay, 0 to 3 percent slopes; and MwA—Monwebb clay, 0 to 1 percent slopes, occasionally flooded.

This site occurs on broad planes or slightly depressed areas with slopes ranging from 0 to 3 percent. The soils are very deep, with calcareous, clayey surfaces and subsoils. The soils are moderately well drained, runoff is slow to very slow, and permeability is very slow. The surface will crack when dry. This site can be very productive because of high water holding capacity and slow runoff.

The historic climax plant community is open grassland. The composition, by weight, is 95 percent grasses, 5 percent forbs, and a few woody plants. The amount of brush has been kept at a low level because of periodic widespread range fires.

The dominant plants consist of 25 percent pink pappusgrass and plains bristlegrass; 20 percent curly-mesquite and tobosagrass; 10 percent alkali sacaton; 10 percent two-flower trichloris and silver bluestem; 10 percent Arizona cottontop and lovegrass tridens; 10 percent vine-mesquite, buffalograss, white tridens and big sacaton; 5 percent fall witchgrass, slim tridens, perennial threeawn, whorled dropseed, and Texas bristlegrass; 5 percent forbs, such as bundleflower, orange zexmenia, bushsunflower, Texas varilla, and some annual forbs; and 5 percent woody plants such as mesquite, guayacan, spiny hackberry, whitebrush, four-wing saltbush, lotebush, allthorn, pricklypear, tasajillo, huisache, screwbean, and twisted acacia.

As the climax plant community deteriorated from heavy and continuous grazing, plants such as two-flower trichloris, Arizona cottontop, alkali sacaton, and the more palatable perennial forbs decrease in abundance. They are replaced initially by pink pappusgrass and plains bristlegrass and later by buffalograss, curly-mesquite, and woody plants. If the absence of periodic fires and overgrazing continues, the woody plants native to the site continue to increase in abundance and whitebrush, pricklypear, and other brush species invade. The woody plants dominate an understory of curly-mesquite, red grama, Hall’s panicum, whorled dropseed, perennial threeawn, Texas grama, and forbs including bitterweed, goldenweed, annual broomweed, and coneflower.

Clay Loam 18 to 25” PZ

This group includes soil mapping unit: ChB—Chacon sandy clay loam, 0 to 2 percent slopes.

The site occurs on stream terraces with slopes usually less than 3 percent. The soils are very deep with a sandy clay loam surface and clayey subsoils. Permeability of the subsoil is very slow. The water holding capacity and production potential on this site is high.

The historic climax plant community is that of open grassland with some scattered mesquite trees and woody shrubs. The brush canopy has been kept at a low level by periodic widespread range fires. The composition by weight is 90 percent grasses, 5 percent forbs, and 5 percent woody plants. This site is found in both MLRA 83A and MLRA 83C. Production is higher in MLRA 83A because of the higher rainfall amount received.

The dominant plants consist of 40 percent plains lovegrass, two-flower and four-flower trichloris, Arizona cottontop, pinhole bluestem, and plains bristlegrass; 20 percent buffalograss, curly-mesquite, and hooded windmillgrass; 15 percent pink pappusgrass; 15 percent Texas wintergrass, lovegrass tridens, white tridens, and perennial threeawn; 5 percent forbs such as bushsunflower, orange zexmenia, and bundleflower; and 5 percent woody plants, such as mesquite, condalia, spiny hackberry, guayacan, and pricklypear.

Range deterioration occurs as a result of heavy and continuous grazing. As deterioration of the climax plant community progresses, two-flower and four-flower trichloris, Arizona cottontop, lovegrass tridens, plains bristlegrass, and many palatable perennial forbs are the first plants to be grazed out. They are replaced initially by woody plants such as mesquite, blackbrush, whitebrush, and by grasses such as curly-mesquite. If overgrazing continues, the site is dominated by a wide array of woody plants and by an understory of short grasses such as red grama, perennial threeawn, curly-mesquite, and Hall’s panicum.

Clayey Bottomland 18 to 35” PZ

This group includes soil mapping units: ClA—Cochina clay, 0 to 1 percent slopes, occasionally flooded; and CmA—Cochina clay, 0 to 1 percent slopes, frequently flooded. (fig. 15)

This site occurs on flood plains and low terraces of old flood plains that receive overflow about 50 times in 100 years in the frequently flooded units, and 5 to 50 times in 100 years in the occasionally flooded units. The soils are very deep, calcareous or neutral clayey soils throughout. The soils crack when dry and have a high shrink-swell potential. The soils are moderately well drained, runoff is medium, and the permeability is very slow. Water holding capacity is high, but available water for plant use is medium because of tight capillary pull of the clay minerals. These soils are on alluvial flood plains and the natural fertility is high.

The historic climax plant community was a mixed grass savannah that could be further characterized as a hardwood savannah. Hardwood trees like oaks, elm, hackberry, cottonwood, palmetto, and pecan are typical and become more prevalent immediately adjacent to streams. The plant communities on this site are highly productive because of the natural fertility of the alluvial soils.

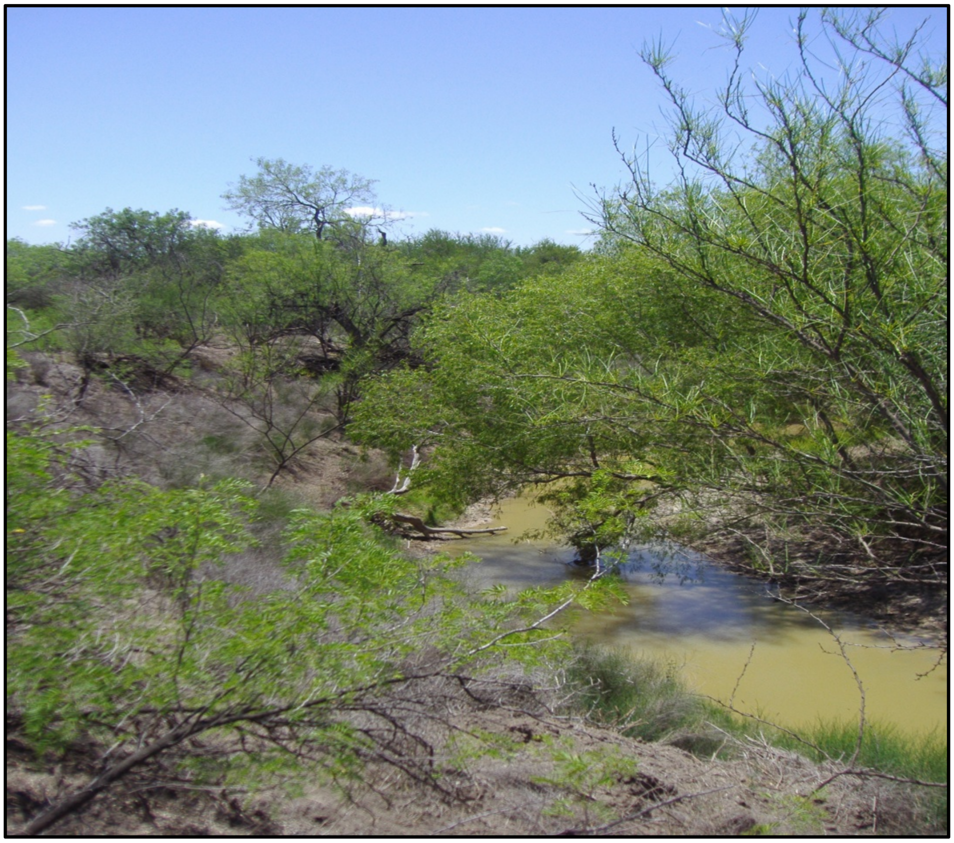

Figure 15.—The Frio River, which is spring fed, will flow year-round even in the doughtiest times. This provides available water that supports dense woody plant communities, such as retama, bull mesquite, hackberry, and pecan. Cochina clay, 0 to 1 percent slopes, frequently flooded soils are along the Frio and Nueces Rivers. Cochina soils are in the Clayey Bottomland 18 to 35” PZ ecological site.

The community is dominated by tall and mid grasses such as four-flower trichloris, little bluestem, Indiangrass, southwestern bristlegrasss, Virginia wildrye, and switchgrass. Other grass species commonly found on the site include knotroot bristlegrass, white tridens, and buffalograss.

The climax community supported a variety of forbs including Engelmann daisy, giant ragweed, yellow neptunia, and sensitive briar. The woody component of this ecological site is predominantly hardwood trees which provide about 25 percent canopy cover with an understory of greenbriar, grapes, and berry vines.

Grasses account for about 85 percent of the total annual production, forbs 5 percent, and Woody species 10 percent.

As retrogression occurs, because of heavy continuous grazing or lack of fire and brush management, trees and shrubs often increase to form a dense canopy. This will cause an increase of shade tolerant grasses and a decrease in herbaceous plant production. In a deteriorated condition many of the following invaders may be seen growing on the site: bushy bluestem, western ragweed, bitter sneezeweed, frogfruit, sumpweed, and annual grasses.

Claypan Prairie 18 to 25” PZ

This group includes soil mapping unit: BrB—Brundage fine sandy loam, 0 to 2 percent slopes.

This site occurs on lower lying areas and may pond water on the surface for short periods. The soils are very deep and saline, and have a low available water capacity. This soil has a high content of sodium. Consequently, the soil has poor structure, which impedes the movement of air, moisture, and roots through the soil.

The historic climax plant community is that of semi-open grassland supporting a scattered canopy of brush. The brush has been kept at a low level by unfavorable soil characteristics and by periodic range fires.

The dominant plants consist of 40 percent pink pappusgrass, plains bristlegrass, sand dropseed, hooded windmillgrass, and pinhole bluestem; 10 percent is two-flower and four-flower trichloris, lovegrass tridens, and Arizona cottontop; 10 percent is vine-mesquite and white tridens; 15 percent is buffalograss and curly-mesquite; 5 percent is whorled dropseed; 10 percent is fall witchgrass, slim tridens, and Texas bristlegrass; and 5 percent are forbs including bundleflower, bushsunflower, orange zexmenia, ruellia, and other forbs. Woody plants such as mesquite, whitebrush, huisache, pricklypear, tasajillo, allthorn, lotebush, granjeno, Berlandier wolfberry, and screwbean make up about 5 percent of the historic climax plant community.

As the range condition deteriorates from heavy and continuous grazing, two-flower and four-flower trichloris, Arizona cottontop, lovegrass tridens, and the most palatable forms decrease and are eventually grazed out of the plant community. These plants are replaced by pink pappusgrass, plains bristlegrass, curly-mesquite, hooded windmillgrass, and less palatable forbs and brush.

With continued heavy use of the range and further deterioration, the understory vegetation is dominated by whorled dropseed, red grama, red lovegrass, perennial threeawn, and unpalatable forbs. Goldenweed may dominate the plant community at this stage. Continued heavy use and no periodic range fires result in a moderate canopy of brush.

Gray Loamy Upland 18 to 25” PZ

This group includes soil mapping units: AgB—Aguilares fine sandy loam, 0 to 3 percent slopes; CaB—Caid sandy clay loam, 0 to 3 percent slopes; CkB—Choke silty clay loam, 1 to 3 percent slopes; CpC—Copita sandy clay loam, 1 to 5 percent slopes; and LnB—Leoncita fine sandy loam, 1 to 3 percent slopes.

This site occurs on uplands with slopes ranging from 0 to 5 percent. These soils are moderately deep or very deep, and have calcareous fine sandy loam or sandy clay loam surfaces over pack sand, weakly cemented sandstone, or tuffaceous material. Soil fertility and available water holding capacity are low to medium.

The historic climax plant community in this range is semi-open grassland; scattered moderate canopy of brush make up 5 to 15 percent of the plant community. The amount of brush present has been kept at a low level because of periodic widespread range of fires.

About 35 percent of the climax vegetation is two-flower and four-flower trichloris; 15 percent is Arizona cottontop and lovegrass tridens; 25 percent is plains bristlegrass, pink pappusgrass, and silver bluestem; 5 percent is hooded windmillgrass and sand dropseed; and 5 percent is buffalograss and curly-mesquite. Other grasses, which make up about 5 percent of the historic climax plant community, include slim tridens, perennial threeawn, fall witchgrass, and Texas bristlegrass. Forbs, including bundleflower, western ragweed, dalea, bushsunflower, and orange zexmenia and some annual forbs make up about 5 percent. Woody plants, including guajillo, blackbrush, mesquite, huisache, lotebush, bumelia, granjeno, prickly-ash, coyotillo, guayacan, pricklypear, tasajillo, ephedra, narrow-leaf elbowbush, cenizo, and palo verde, make up the remaining 5 percent.

As the range deteriorates from heavy and continuous grazing and the absence of periodic fires, two-flower and four-flower trichloris, Arizona cottontop, lovegrass tridens, and many palatable perennial forbs are grazed out of the plant community.

Plants that initially increase as a result of range deterioration include plains bristlegrass, pink pappusgrass, and silver bluestem. If heavy use continues, the understory composition consists mainly of Texas bristlegrass, Hall’s panicum, red gama, perennial threeawn, and many unpalatable perennial and annual forbs.

Continued overgrazing and the absence of periodic range fires result in a dense canopy of guajillo, blackbrush, pricklypear, mesquite, and other climax brush species. Goldenweed commonly forms thick canopies under these conditions. At this stage of range deterioration, the soil surface becomes crusted, impeding the infiltration of rainfall and the germination of seeds. The potential for severe erosion is high because of the large percentage of the soil being bare.

Gravelly Ridge 18 to 35” PZ

This group includes soil mapping unit: MaD—Mata very gravelly sandy clay loam, 1 to 8 percent slopes.

This site occurs on uplands with slopes ranging from 1 to 8 percent. This soil is deep to densic bedrock. It is well drained, runoff is medium, and permeability is slow. Because of the gravel, this site can be somewhat droughty. However, the gravelly nature of the soil allows the soil to release moisture readily for plant growth, making light showers of high intensity effective.

The historic climax plant community is that of an open grassland interspersed with a variety of scattered woody shrubs and perennial forbs. The composition by weight is about 85 percent grasses, 5 percent forbs, and 10 percent woody plants.

The dominant plants consist of 60 percent tanglehead, green sprangletop, pinhole bluestem, plains bristlegrass, plains lovegrass, two-flower trichloris, Arizona cottontop, lovegrass tridens, sideoats grama, Neally grama, and pink pappusgrass; 20 percent reverchon panicum, fall witchgrass, slim tridens, hooded windmillgrass, hairy grama, and perennial threeawn; 5 percent buffalograss and curly-mesquite; 5 percent forbs such as bushsunflower, orange zexmenia, menodora, and bundleflower; 10 percent woody plants such as guajillo, blackbrush, range ratany, false mesquite, vine ephedra, guayacan, desert yaupon, littleleaf sumac, Texas colubrina, feather dalea, and cenizo.

Green sprangletop, plains lovegrass, pinhole bluestem, plains bristlegrass, and bushsunflower are preferred by livestock and thus are grazed out under continuous, heavy grazing by livestock. They are replaced by plants such as fall witchgrass, slim tridens, reverchon panicum, and by woody shrubs. If overgrazing continues, the site is dominated by woody plants, such as blackbrush, guajillo, littleleaf sumac, shrubby blue sage, and cenizo, and by an understory of short grasses, such as red grama, hairy tridens, perennial threeawn, Hall's panicum, and annual forbs and grasses.

Lowland 22 to 35" PZ

This group includes soil mapping unit: CtA—Coquat clay, 0 to 1 percent slopes, frequently flooded. (fig. 16)

This site is found along the Nueces River and its tributaries on the flood plain and flood plain steps. The slope ranges from 0 to 1 percent but there are many braided channels and sloughs with short steep inclusions. Also, there are many micro-highs and micro-lows across the landform because of shrink-swell properties, and pedestals created by the native plant community. The soils are somewhat poorly drained, saline, sodic, very slow permeability, and low runoff.

The historic plant communities are that of open grassland and have little to no brush canopy.

The dominant plants consist of 85 percent gulf cordgrass; 5 percent big sacaton; 5 percent Hartweg paspalum, white tridens, and silver bluestem; 5 percent vine-mesquite, buffalograss, curly-mesquite, shoregrass, a few forbs, and a few woody plants such as mesquite, retama, spiny aster, and screwbean.

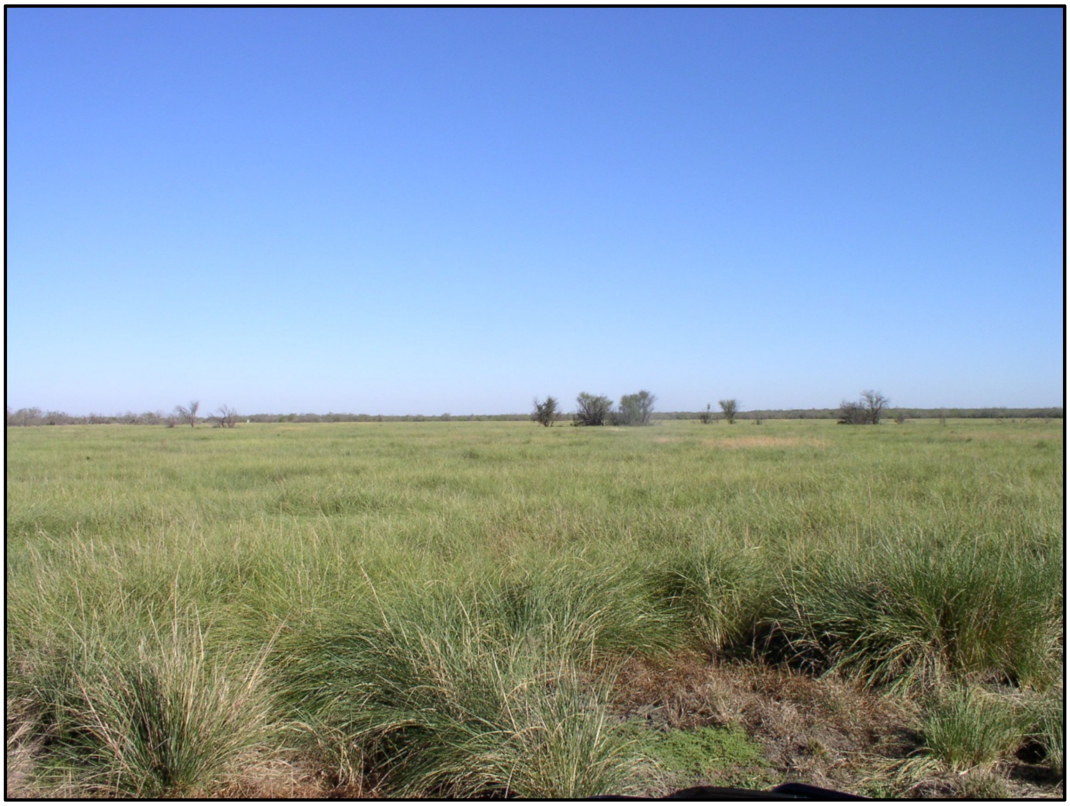

Figure 16.—Gulf cordgrass on an area Coquat clay, 0 to 1 percent slopes, frequently flooded. Gulf cordgrass is found on the flood plain and flood plain steps along the Nueces River in the western portion of McMullen County. While it is not palatable to livestock when it becomes mature, the gulf cordgrass provides excellent habitat for migratory birds such as geese and sandhill crane. Coquat soils are in the Lowland 22 to 35" PZ ecological site (MLRA 83B—Western Rio Grande Plain)

Gulf cordgrass is normally quite unpalatable to cattle and thus does not decrease much in abundance under continuous, heavy grazing by livestock. In most areas this range site is associated with other range sites that support more palatable forage. Consequently, this site is seldom grazed.

If the gulf cordgrass is burned in the fall or winter, the young and tender regrowth is palatable for wildlife. If the site is subject to annual burning and to heavy grazing by livestock, the gulf cordgrass and other climax grasses decrease in abundance and are replaced by unpalatable salt-tolerant perennial and annual forbs, woody plants, and grasses, including whorled dropseed. If this occurs, cattle tend not to graze the site and gulf cordgrass becomes reestablished.

Rolling Hardland 18 to 25” PZ

This group includes soil mapping unit: the Maverick part of CVB—Cotulla-Maverick complex, 1 to 3 percent slopes; and McC—Maverick clay, 2 to 5 percent slopes.

This site is on upland with slopes ranging from 1 to 5 percent. The Maverick soils are moderately deep to densic bedrock, and were developed from calcareous clayey materials. Rainfall intake is slow, especially where deterioration of the surface soil is present because surface crusting and hoofpans are common. These soils have low to moderate available water capacity, salinity, and high clay content that causes the soil to be droughty.

The historic climax plant community is semi-open grassland. It is interspersed with scattered brush. The composition by weight is about 90 percent grasses, 5 percent forbs, and 5 percent woody plants. The brush canopy has been kept relatively open by periodic widespread range fires.

The dominant plants consist of 45 percent four-flower trichloris, lovegrass tridens, pinhole bluestem, pink pappusgrass, and plains lovegrass; 15 percent plains bristlegrass and Arizona cottontop; 15 percent buffalograss and curly-mesquite; 15 percent fall witchgrass, hooded windmillgrass, perennial threeawn, bristle panicum, and Texas bristlegrass; 5 percent forbs such as bushsunflower, bundleflower, and orange zexmenia; and 5 percent woody plants, such as guayacan, Texas kidneywood, guajillo, blackbrush, mesquite, allthorn, and four-wing saltbush.

As the range site deteriorates from heavy and continuous grazing and the absence of fire, four-flower trichloris, plains lovegrass, bushsunflower, Arizona cottontop, and pinhole bluestem decreases. They are replaced initially by woody plants and grasses such as fall witchgrass, perennial threeawn, and curly-mesquite.

Eventually, under continued heavy use, the understory will result in mainly red grama, Hall’s panicum, whorled dropseed, Texas bristlegrass, slim tridens, and some unpalatable forbs. Saladilla invades the more abused areas. Overuse and absence of periodic range fires result in a moderate to thick canopy of blackbrush, guajillo, and other climax brush species. Goldenweed and rabbitbrush also invade under these conditions.

At this stage of deterioration, significantly large areas are bare and surface crusting results. The hard surface impedes rainfall infiltration. Evaporation increases, causing salts in the subsoil to rise nearer to the surface. Water erosion also becomes a severe problem.

Saline Clay 18 to 25” PZ

This group includes soil mapping unit: CcB—Catarina clay, 0 to 2 percent slopes; CuB—Cotulla clay loam, 0 to 3 percent slopes; the Cotulla part of CVB—Cotulla-Maverick complex, 1 to 3 percent slopes; DsB—Dosrios clay, 1 to 3 percent slopes (fig. 17); EvC—Esseville clay, 1 to 5 percent slopes; LeB—Lasalle clay, 1 to 3 percent slopes; and VrC—Viboras clay, 1 to 5 percent slopes.

This site occurs on upland areas with slopes ranging from 0 to 5 percent. The soils are moderately deep or very deep, calcareous, saline sodic clays. These soils are moderately well and well drained, runoff is medium to rapid, and permeability is slow or

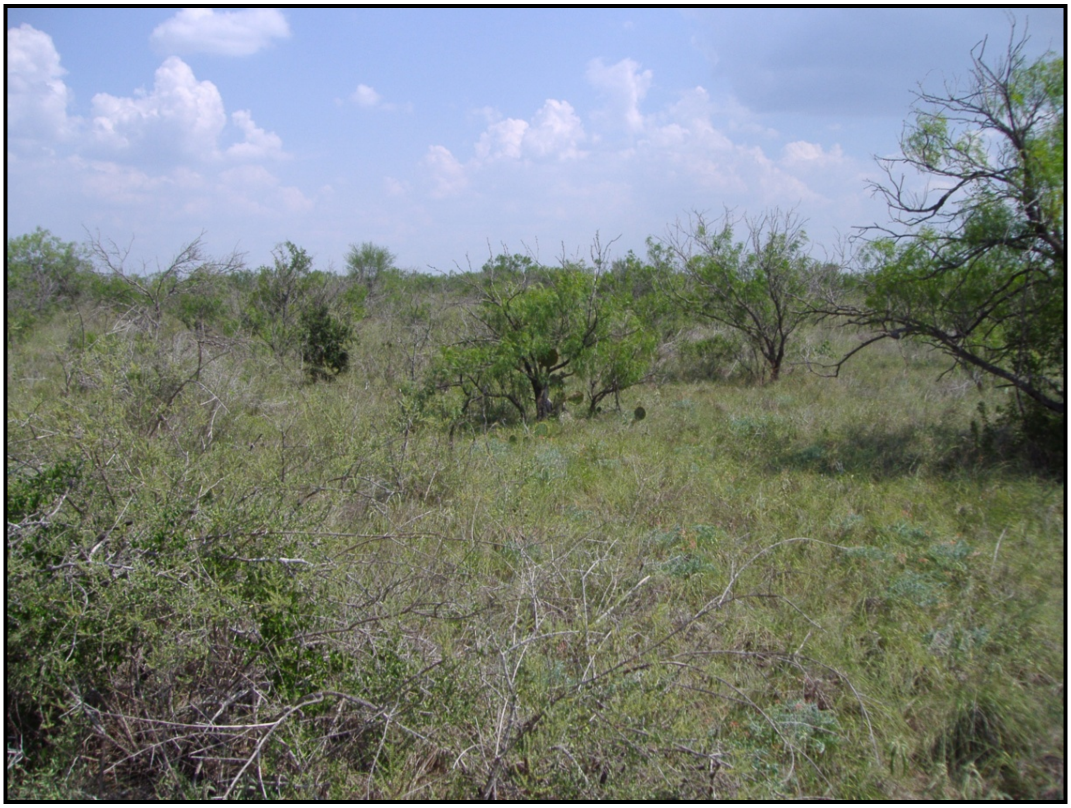

Figure 17.—Rangeland on an area of Dosrios clay, 1 to 3 percent slopes. The vegetation includes mesquite, whitebrush, granjeno, guayacan, prickly pear, salidio, pink pappusgrass, four-flower trichloris, and plains bristlegrass. Dosrios soils are in the Saline Clay 18 to 25” PZ ecological site (MLRA 83B—Western Rio Grande Plain).

very slow. The amount of available water for plants is restricted by the salinity of the soil and causes this site to be quite droughty. Gully and sheet erosion is a problem on some slopes.

The historic climax plant community on this site is generally open grassland. Scattered low-growing brush species forms thin canopies that cover up to 5 percent of the range site. The composition by weight is about 90 percent grasses, 5 percent forbs, and 5 percent woody plants. The brush canopies have been kept relatively open by periodic widespread range fires and by the high salinity of the soils, which tends to stunt the growth of the brush.

The dominant plants consist of 25 percent two-flower trichloris, four-flower trichloris, and alkali sacaton; 20 percent white tridens, vine-mesquite, and pink pappusgrass; 15 percent buffalograss and curly-mesquite; 10 percent pinhole bluestem, and Arizona cottontop; 10 percent plains bristlegrass; 10 percent whorled dropseed, Hall’s panicum, and perennial threeawn; 5 percent forbs, such as bundleflower, screwbean, and ruellia; and 5 percent woody plants, such as armed and four-wing saltbush, spiny hackberry, mesquite, guayacan, condalia, pricklypear, and desert yaupon.

As the climax plant community deteriorates under both heavy and continuous grazing and the absence of fire, two-flower trichloris, Arizona cottontop, alkali sacaton, and the more palatable perennial forbs decrease and are eventually grazed out of the plant community. They are replaced initially by plants such as curly-mesquite, pink pappusgrass, plains bristlegrass, Hall’s panicum, and in some areas, tobosagrass.

Eventually, under continued heavy use, the understory consists mainly of a thin blanket of curly-mesquite and significant amounts of red grama, whorled dropseed, and some forbs including bitterweed and coneflower.

If there are no periodic range fires, continued over use results in a moderate canopy of mesquite and other climax brush species. Thick canopies of goldenweed commonly invade under these conditions.

At this stage of range deterioration, significantly large areas are bare and the soil begins to crust. Because of the crusting, less water is absorbed by the soil and more water runs off the soil. Thus, there is an increased hazard of water erosion. Evaporation at the surface increases, causing salts in the subsoil to rise nearer to the surface. Consequently the site becomes droughty.

Saline Clay Loam 18 to 35” PZ

This group includes soil mapping unit: MoC—Moglia sandy clay loam, 1 to 5 percent slopes.

This site is on upland areas with slopes ranging from 1 to 5 percent. This soil is very deep, with clay loam or loam textures. Permeability of the subsoil is moderately slow. This soil is saline with streaks and pockets of gypsum and other salts in the subsoil. Rainfall intake is slow, runoff is medium to rapid, and available water capacity is low to medium because of the salinity of the subsoils. The site is slow to recover after the grass cover is removed as the soil crust retards rainfall intake and seedling establishment.

The historic plant community consists of mid and short grasses interspersed with a few woody plants. The brush canopies have been kept relatively open by periodic widespread range fires. The composition by weight is about 90 percent grasses, 5 percent forbs, and 5 percent woody plants.

The dominant plants consist of 35 percent white tridens, vine-mesquite, and pink pappusgrass; 15 percent two-flower trichloris; 15 percent plains bristlegrass, Arizona cottontop, and bristle panicum; 15 percent buffalograss and curly-mesquite; 10 percent fall witchgrass, Hall’s panicum, and perennial threeawn; 5 percent forbs, such as bundleflower, bushsunflower, and orange zexmenia; and 5 percent woody plants, such as guajillo (fig. 18), blackbrush, spiny hackberry, mesquite, guayacan, condalia, pricklypear, and desert yaupon.

Trichloris, vine-mesquite, and bushsunflower are grazed out under continuous, heavy grazing by livestock. They are replaced initially by plants such as curly-mesquite and Hall’s panicum and by woody plants. If overgrazing continues, woody plants continue to invade and increase in abundance and blackbrush, other brush species, broomweed, and goldenweed form a dense canopy.

Sandy Loam 18 to 25” PZ

This group includes soil mapping unit: BsB—Brystal fine sandy loam, 0 to 3 percent slopes.

This site occurs on upland areas with slopes ranging from 0 to 3 percent. These soils are very deep with noncalcareous fine sandy loam surfaces. The soils are well drained, runoff is medium, and permeability is moderate. They absorb rainfall readily and have a high available water capacity, making this a highly productive site.

The historic climax vegetation grows on open grassland interspersed with a variety of mixed-brush and forbs. The brush has been kept at the same level by periodic, widespread range fires. The composition by weight is about 90 percent grasses, 5 percent woody plants, and 5 percent forbs.

About 30 percent of the climax vegetation is four-flower trichloris and tanglehead; about 20 percent is Arizona cottontop, lovegrass tridens, southwestern bristlegrass, and silver bluestem; 10 percent is plains bristlegrass and slender grama; 10 percent is hooded windmillgrass and sand dropseed; and 10 percent is pink pappusgrass. The remaining 10 percent of grasses include slim tridens, Texas bristlegrass, knotroot

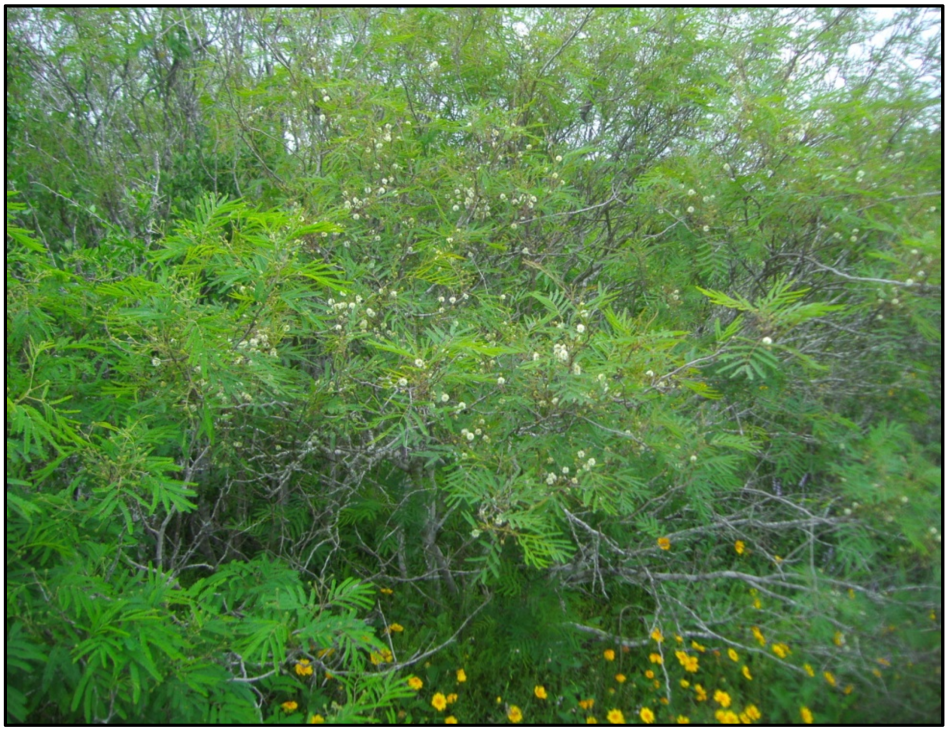

Figure 18.—Guajillo is commonly found on Gray Sandy Loam and Saline Clay Loam ecological sites. This plant is an excellent source of food for wildlife, but has been known to cause toxicity in livestock during extreme drought periods if execessive amounts are consumed over a long period of time. This plant is extremely drought tolerant and can be all that is available as forage to livestock during extensive drought periods which are common in McMullen County.

bristlegrass, perennial threeawn, fall witchgrass, gummy lovegrass, hairy grama, and thin paspalum. About 5 percent is forbs, including western indigo, sensitive-briar, bundleflower, milkpea, dalea, neptunia, roundleaf tephrosia, dayflower, orange zexmenia, bushsunflower, and some annual forbs.

Woody plants, including mesquite, brazil, granjeno, huisache, prickly-ash, whitebrush, catclaw acacia, lotebush, pricklypear, littleleaf sumac, Berlandier wolfberry, desert yaupon, guayacan, narrow-leaf elbowbush, Texas kidneywood, Texas persimmon, and ephedra, make up the remaining 5 percent of species composition.

As the range deteriorates from heavy and continuous grazing, four-flower trichloris, tanglehead, Arizona cottontop, southwestern bristlegrass, lovegrass tridens, and many palatable perennial forbs decrease and are eventually grazed out of the plant community. These plants are initially replaced by plains bristlegrass, slender grama, hooded windmillgrass, sand dropseed, and pink pappusgrass.

Eventually, with continued heavy use of the range and further deterioration, the understory consists mainly of annual forbs, such as sunflower and cowpen daisy, unpalatable perennial forbs, red lovegrass, red grama, Hall’s panicum, grassbur, Texas bristlegrass, and goldenweed. Continuous overgrazing and a lack of periodic range fires result in a dense canopy of mesquite and other climax brush species, along with an increase of goldenweed.

At this stage of range deterioration, significantly large areas are bare, and the soil begins to crust. Because of the crusting, less water is absorbed by the soil and more water runs off the soil. Thus, there is an increased hazard of erosion.

Shallow Sandy Loam 18 to 25” PZ

This group includes soil mapping unit: VeC—Verick fine sandy loam, 1 to 5 percent slopes.

This site can be found on slopes ranging from 1 to 5 percent slopes. The site is found on narrow ridges on cuestas and mesas. The soils are very shallow and shallow to paralithic bedrock, which limits the availability to store water for plants. Permeability is moderate and runoff is low.

The historic climax vegetation grows on grassland interspersed with a variety of brush and forbs. The composition by weight is about 90 percent grasses, 5 percent forbs, and 5 percent woody plants.

About 40 percent of the climax vegetation is midgrasses such as pinhole bluestem, two-flower trichloris, plains bristlegrass; 15 percent other midgrass species including pink pappusgrass and Arizona cottontop; 35 percent shortgrasses such as hooded windmillgrass, buffalograss, curly-mesquite, fall witchgrass, and sand dropseed; perennial forbs such as orange zexmenia, skeletonleaf goldeneye, dayflower, bushsunflower, rock daisy, dalea, menodora, halfshrub sundrop, and other annual forbs make up about 5 percent of the climax vegetation; and woody shrubs such as guajillo, blackbrush, Texas kidneywood, coyotillo, lotebush, guayacan, desert yaupon, mesquite, littleleaf sumac, cenizo, shrubby blue sage, narrow-leaf elbowbush, Berlandier wolfberry, ephedra, knifeleaf condalia, pricklypear, and tasajillo make up the remaining 5 percent.

The brush canopy remained moderate because the relatively low grass production was not enough to fuel the range fires that would have kept the canopy more open.

Deterioration of the plant community occurs as the site is heavily and continuously grazed. As the range deteriorates, silver bluestem, tanglehead, Arizona cottontop, and most palatable perennial forbs are grazed out of the plant community. These plants are initially replaced by plains bristlegrass, pink pappusgrass, hooded windmillgrass, sand dropseed, slender grama, fall witchgrass, less palatable forbs, and an increased growth of shrubs.

Eventually, as heavy use of the range continues, the understory consists mainly of perennial threeawn, slim tridens, hairy tridens, red grama, red lovegrass, sandbur, gummy lovegrass, Hall’s panicum, and many unpalatable perennial and annual forbs. In the absence of competition from strong perennial grasses and with no periodic range fires, the shrub canopy becomes dense.

At this stage of range deterioration, significantly large areas are bare, and the soil begins to crust. Because of the crusting, less water is absorbed by the soil and more water runs off the soil. Thus, there is an increased hazard of erosion.

Shallow 18 to 25” PZ

This group includes soil mapping unit: WhC—Whitsett fine sandy loam, 1 to 5 percent slopes.

This site usually occurs on plains which occupy slightly higher elevations than surrounding deeper soils and can have slopes ranging from 1 to 5 percent. The soils which characterize this site are very shallow and shallow loamy soils which have formed over caliche, mudstone, sandstone, or calcareous materials. Erosion potential is low where adequate ground cover is maintained, but soil erosion will increase as slope increases or as denuded conditions become prevalent.

The historical climax plant community was open grassland with occasional scattered woody shrubs and perennial forbs. This site is dominated by mid and short grasses which are relatively limited in production reflecting a droughty site with a low available water holding capacity

This community is dominated by feathery bluestem, sideoats grama, pink pappusgrass, Texas cupgrass, little bluestem, Arizona cottontop, tanglehead, and vine-mesquite. Short grasses such as plains bristlegrass, buffalograss, curly-mesquite, slim tridens and hooded windmillgrass can also be found on this site.

Forbs do not make up a major component of the plant community on this site but common ones include orange zexmenia, bushsunflower, prairie acacia, Engelmann daisy, bundleflower, sensitivebriar, and annual forbs. This site supports a diverse woody component which includes guajillo, guayacan, kidneywood, blackbrush, desert yaupon, granjeno, and vine-ephedra.

Grasses account for 85 percent of the total annual production, forbs 5 percent, and woody species 10 percent.

As retrogression occurs, because of heavy continuous grazing or lack of fire and brush management, grasses like red grama, threeawn, Hall's panicum, and hairy tridens will increase. Woody species like granjeno, guajillo, blackbrush, and mesquite will increase in number and dominate this site. In a denuded state, the bare ground crusts over causing an increase in potential erosion and reduced water infiltration was well as inhibiting seedling growth.

MLRA 83C—Central Rio Grande Plain

Clay Loam 20 to 25" PZ

This group includes soil mapping units: CyB—Coy clay loam, 1 to 3 percent slopes; and ZvC—Zavco sandy clay loam, 1 to 5 percent slopes.

The historic climax plant community is that of open grassland with some scattered mesquite trees and woody shrubs. The brush canopy has been kept at a low level by periodic widespread range fires. The composition by weight is 90 percent grasses, 5 percent forbs, and 5 percent woody plants. This site is found in both MLRA 83A and MLRA 83C. Production is higher in MLRA 83A because of the higher rainfall amount received.

The dominant plants consist of 40 percent plains lovegrass, two-flower and four-flower trichloris, Arizona cottontop, pinhole bluestem, and plains bristlegrass; 20 percent buffalograss, curly-mesquite, and hooded windmillgrass; 15 percent pink pappusgrass; 15 percent Texas wintergrass, lovegrass triden, white triden, and perennial threeawn; 5 percent forbs such as bushsunflower, orange zexmenia, and bundleflower; and 5 percent woody plants, such as mesquite, condalia, spiny hackberry, guayacan, and pricklypear.

Range deterioration occurs as a result of heavy and continuous grazing. As deterioration of the climax plant community progresses, two-flower and four-flower trichloris, Arizona cottontop, lovegrass triden, plains bristlegrass, and many palatable perennial forbs are the first plants to be grazed out. They are replaced initially by woody plants such as mesquite, blackbrush, whitebrush, and by grasses such as curly-mesquite. If overgrazing continues, the site is dominated by a wide array of woody plants and by an understory of short grasses such as red grama, perennial threeawn, curly-mesquite, and Hall's panicum.

Gray Loamy Upland 20 to 25" PZ

This group includes soil mapping unit: SaB—Salco fine sandy loam, 1 to 3 percent slopes. These soils are very deep and have low available water capacity.

The historic climax plant community in this range is a semi-open grassland; scattered moderate canopy of brush make up 5 to 15 percent of the plant community. The amount of brush present has been kept at a low level because of periodic widespread range of fires.

About 35 percent of the climax vegetation is two-flower and four-flower trichloris; 15 percent is Arizona cottontop and lovegrass tridens; 25 percent is plains bristlegrass, pink pappusgrass, and silver bluestem; 5 percent is hooded windmillgrass and sand dropseed; and 5 percent is buffalograss and curly-mesquite. Other grasses, which make up about 5 percent of the historic climax plant community, include slim tridens, perennial threeawn, fall witchgrass, and Texas bristlegrass. Forbs, including bundleflower, western ragweed, dalea, bushsunflower, orange zexmenia, and some annual forbs make up about 5 percent. Woody plants, including guajillo, blackbrush, mesquite, huisache, lotebush, bumelia, granjeno, prickly-ash, coyotillo, guayacan, pricklypear, tasajillo, ephedra, narrow-leaf elbowbush, cenizo, and palo verde, make up the remaining 5 percent.

As the range deteriorates from heavy and continuous grazing and the absence of periodic fires, two-flower and four-flower trichloris, Arizona cottontop, lovegrass tridens, and many palatable perennial forbs are grazed out of the plant community.

Plants that initially increase as a result of range deterioration include plains bristlegrass, pink pappusgrass, and silver bluestem. If heavy use continues, the understory composition consists mainly of Texas bristlegrass, Hall’s panicum, red grama, perennial threeawn, and many unpalatable perennial and annual forbs.

Continued overgrazing and the absence of periodic range fires result in a dense canopy of guajillo, blackbrush, pricklypear, mesquite, and other climax brush species. Goldenweed commonly forms thick canopies under these conditions. At this stage of range deterioration, the soil surface becomes crusted, impeding the infiltration of rainfall and the germination of seeds. The potential for severe erosion is high because of the large percentage of the soil being bare.

Gray Sandy Loam 20 to 25” PZ

This group includes soil mapping units: AnC—Annarose fine sandy loam, 2 to 5 percent slopes; BeC—Benavides fine sandy loam, 2 to 5 percent slopes; HoB—Houla clay loam, 1 to 3 percent slopes (fig. 19); PrC—Pernitas fine sandy loam, 1 to 5 percent slopes; PtB—Pernitas sandy clay loam, 1 to 5 percent slopes; and SrC—Sarnosa fine sandy loam, 2 to 5 percent slopes.

This site occurs on areas with slopes ranging from 0 to 5 percent. The soils are moderately deep or very deep, with calcareous sandy clay loam or fine sandy loam surfaces, and highly calcareous loamy subsoils. Permeability of the subsoil is moderate and the available water holding capacity of these soils in low to moderate.

The historic climax plant community is that of an open grassland. It is interspersed with scattered woody plants. The composition, by weight, is about 90 percent grasses, 5 percent forbs, and 5 percent woody plants. The bush canopy has been kept relatively open by periodic range fires.

The dominant plants consist of 40 percent tanglehead, four-flower trichloris, lovegrass tridens, Arizona cottontop, pinhole bluestem, and pink pappusgrass; 25 percent is fall witchgrass, vine-mesquite, buffalograss, and curly-mesquite; 20 percent is plains bristlegrass; 5 percent perennial threeawn and slim tridens; 5 percent consists of forbs such as orange zexmenia, bundleflower, and bushsunflower; and 5 percent consists of woody plants such as mesquite, blackbrush, vine ephedra, guayacan, desert yaupon, pricklypear, Texas kidneywood, and Texas colubrina.

Tanglehead, four-flower trichloris, pinhole bluestem, and plains bristlegrass decrease in abundance under continuous heavy grazing by livestock and the absence of fire. These plants are replaced initially by plants such as hooded windmillgrass, curly-mesquite, perennial threeawn, and woody plants. Continuous overgrazing and the absence of fire will result in a dense canopy of the climax brush species over a sparse cover of plants such as perennial threeawn, Hall’s panicum, western ragweed, croton, tumblegrass, red grama, sandbur, and annual weeds and grasses. Infestations of goldenweed, rabbitbrush, and perennial broomweed may also result because of heavy continuous grazing.

At this stage of range deterioration, the soil surface becomes crusted and compacted because large areas of the ground are bare. The hard surface impedes rainfall absorption and seed germination. Also, there is an increased hazard of erosion.

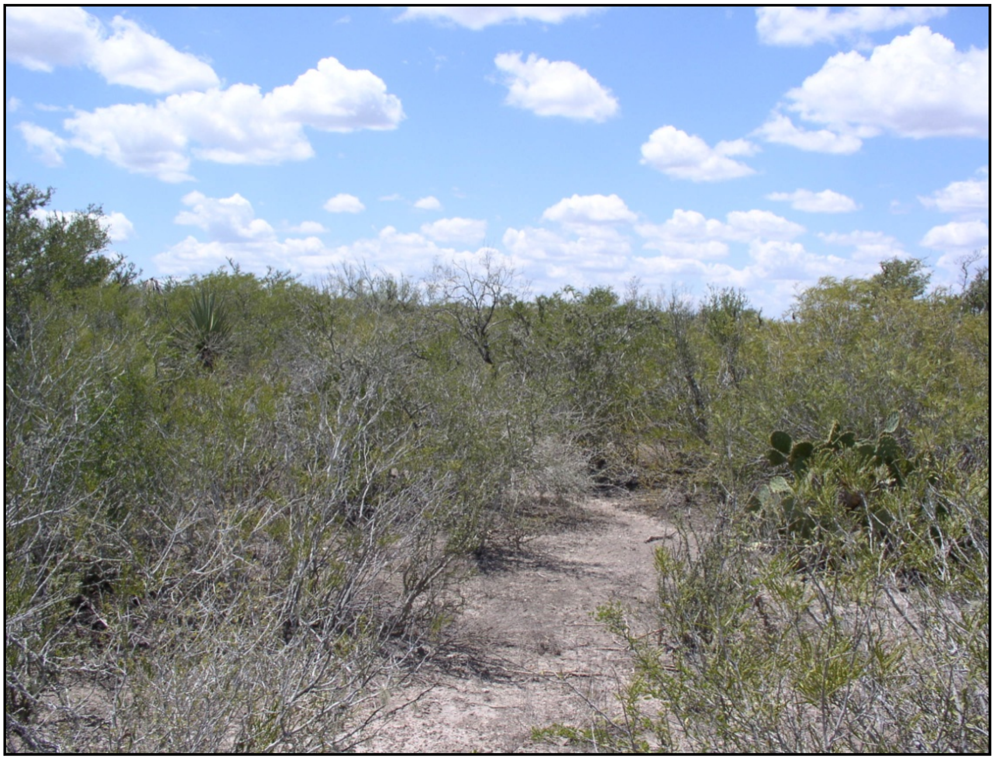

Figure 19.—An area of Houla clay loam, 1 to 3 percent slopes. Brush control is often a management concern for the Houla series. Houla soils are in the Gray Sandy Loam 20 to 35” PZ ecological site (MLRA 83C—Central Rio Grande Plain). The brush species in this picture include guajillo, yucca, mesquite, and prickly pear.

Loamy Bottomland 20 to 35” PZ

This group includes soil mapping units: AlB—Alet sandy clay loam, 0 to 2 percent slopes, flooded, and StB—Sinton sandy clay loam, 0 to 2 percent slopes, frequently flooded.

This site occurs on low terraces of old flood plains above streams and on active flood plains that receive overflow about twice in every five years. The soils are very deep noncalcareous and calcareous sandy clay loams. The soils are well drained, runoff is negligible, and permeability is moderate. The soils have a medium to high available water holding capacity. These factors together with the natural high fertility of the soils favors high yields of good quality forage on this site.

The historic climax plant community varies according to landscape position. It is a mixture of trees, shrubs, grasses, and forbs. The composition, by weight, is about 80 percent grasses, 5 percent forbs, and 15 percent woody plants. The frequency and amount of overflow also have an influence on the plant community make up.

The dominant plants consist of 40 percent four-flower trichloris, southwestern bristlegrass, big cenchrus, big sacaton, and switchgrass; 15 percent white tridens, vine-mesquite, and pink pappusgrass; 15 percent buffalograss, plains bristlegrass, and sedges; 10 percent Texas wintergrass and Virginia wildrye; 5 percent forbs such as bundleflower, ruellia, and sensitive-briar; and 15 percent woody plants, such as hackberry, pecan, elm, willow, live oak, and mesquite.

Deterioration of the historic climax plant community occurs if the site is subjected to heavy and continuous grazing and the absence of fire. The taller grasses such as four-flower trichloris, switchgrass, big cenchrus, southwestern bristlegrass, and big sacaton decrease in abundance. They are replaced initially by plants such as sedges, buffalograss, hooded windmillgrass, fall witchgrass, and a diversity of woody plants. If overgrazing continues, the woody plants such as mesquite, spiny hackberry, whitebrush, and huisache continue to invade and increase in abundance and dominate an understory of sedges, red threeawn, Hall's panicum, filly panicum, bermudagrass, tumble windmillgrass, and annual grasses and forbs.

Ramadero 20 to 25" PZ

This group includes soil mapping unit: TaB—Tela sandy clay loam, 0 to 2 percent slopes, flooded.

This site occurs on long, narrow, shallow drainageways for the surrounding landscapes. This soil is very deep, with noncalcareous sandy clay loam surfaces with calcareous subsoils. The soils are well drained, runoff is negligible, and permeability is moderate. The soils are fertile with a high available water holding capacity, making this a high producing site. The soil receives extra water from surrounding ecological sites and upstream flooding.

The historic climax plant community is a semi-open riparian savannah that has understory of productive grasses and moderate canopies of trees and tall brush species. The composition by weight is about 90 percent grasses, 5 percent forbs, and 5 percent woody plants. Periodic range fires have been responsible for keeping the brush canopy open.

About 40 percent of the climax vegetation is two-flower and four-flower trichloris. About 10 percent is Arizona cottontop, 10 percent southwestern bristlegrass and cane bluestem, 5 percent lovegrass tridens and big cenchrus, 10 percent is plains bristlegrass and pink pappusgrass, 5 percent is curly-mesquite and buffalograss, 5 percent vine-mesquite, and 5 percent is hooded windmillgrass. Forbs such as Engelmann's daisy, bushsunflower, western ragweed, orange zexmenia, bundleflower, ruellia, dayflower, and annual forbs make up about 5 percent. The remaining 5 percent is made up of trees and shrubs such as mesquite, hackberry, granjeno, huisache, bumelia, coyotillo, white brush, prickly-ash, brazil, Texas kidneywood, pricklypear, guayacan, tasajillo, Texas persimmon, ephedra, and baccharis.

The condition of the range deteriorates under continuous and heavy grazing and the absence of fire. Initially two-flower trichloris, four-flower trichloris, Arizona cottontop, southwestern bristlegrass, cane bluestem, lovegrass tridens, big cenchrus, and the most palatable forbs are grazed out. If overgrazing continues, the understory consists mainly of Hall's panicum, Texas bristlegrass, whorled dropseed, perennial threeawn, tumblegrass, unpalatable perennial forbs, and annual forbs. With no periodic range fires, overgrazing results in a dense, impenetrable thicket of mesquite, white brush, and other climax brush species.

At this stage of range deterioration, the soil forms a crust that limits rainfall penetration and seeding germination. Also, the soil is subject to erosion.

Sandy Loam 25 to 35" PZ

This group includes soil mapping units: BnB—Brennan fine sandy loam, 0 to 3 percent slopes; WeB—Weesatche fine sandy loam, 0 to 3 percent slopes; and WeC—Weesatche fine sandy loam, 3 to 5 percent slopes.

This site occurs on upland areas with slopes ranging from 0 to 3 percent. These soils are very deep with noncalcareous loamy surfaces. The soils are well drained, runoff is medium, and permeability is moderate. They absorb rainfall readily and have a high available water capacity, making this a highly productive site.

The historic climax vegetation grows on open grassland interspersed with a variety of mixed-brush and forbs. The brush has been kept at the same level by periodic, widespread range fires. The composition by weight is about 90 percent grasses, 5 percent woody plants, and 5 percent forbs.

About 30 percent of the climax vegetation is four-flower trichloris and tanglehead; about 20 percent is Arizona cottontop, lovegrass tridens, southwestern bristlegrass, and silver bluestem; 10 percent is plains bristlegrass and slender grama; 10 percent is hooded windmillgrass and sand dropseed; and 10 percent is pink pappusgrass. The remaining 10 percent of grasses include slim tridens, Texas bristlegrass, knotroot bristlegrass, perennial threeawn, fall witchgrass, gummy lovegrass, hairy grama, and thin paspalum. About 5 percent is forbs, including western indigo, sensitive-briar, bundle flower, milkpea, dalea, neptunia, roundleaf tephrosia, dayflower, orange zexmenia, bushsunflower, and some annual forbs.

Woody plants, including mesquite, brazil, granjeno, huisache, prickly-ash, whitebrush, catclaw acacia, lotebush, pricklypear, littleleaf sumac, Berlandier wolfberry, desert yaupon, guayacan, narrow-leaf elbowbush, Texas kidneywood, Texas persimmon, and ephedra, make up the remaining 5 percent of species composition.

As the range deteriorates from heavy and continuous grazing, four-flower trichloris, tanglehead, Arizona cottontop, southwestern bristlegrass, lovegrass tridens, and many palatable perennial forbs decrease and are eventually grazed out of the plant community. These plants are initially replaced by plains bristlegrass, slender grama, hooded windmillgrass, sand dropseed, and pink pappusgrass.

Eventually, with continued heavy use of the range and further deterioration, the understory consists mainly of annual forbs, such as sunflower and cowpen daisy, unpalatable perennial forbs, red lovegrass, red grama, Hall’s panicum, grassbur, Texas bristlegrass, and goldenweed. Continuous overgrazing and a lack of periodic range fires result in a dense canopy of mesquite and other climax brush species, along with an increase of goldenweed.

At this stage of range deterioration, significantly large areas are bare, and the soil begins to crust. Because of the crusting, less water is absorbed by the soil and more water runs off the soil. Thus, there is an increased hazard of erosion.

Shallow Sandy Loam 20 to 30” PZ

This group includes soil mapping unit: LoC—Lomart loam, 1 to 5 percent slopes.

This soil is moderately deep to paralithic tuffaceous sandstone bedrock. This soil absorbs rainfall readily and has a very low available water capacity.

The historic climax vegetation grows on grassland interspersed with a variety of brush and forbs. The composition by weight is about 85 percent grasses, 10 percent forbs, and 5 percent woody plants.

About 30 percent of the climax vegetation is silver bluestem, tanglehead, and Arizona cottontop. About 10 percent is plains bristlegrass and pink pappusgrass; 15 percent is hooded windmillgrass, sand dropseed, and slender grama; 10 percent is perennial threeawn and slim tridens; and 5 percent is fall witchgrass. Other grasses, which make up about 10 percent of the climax vegetation, include gummy lovegrass, Texas tridens, hairy tridens, and red grama.

Perennial forbs make up about 5 percent of the climax vegetation. They include orange zexmenia, skeletonleaf goldeneye, dayflower, bushsunflower, rock daisy, dalea, menodora, and halfshrub sundrop. A variety of annual forbs also make up about 5 percent of the climax plant community.

Woody shrubs such as guajillo, blackbrush, Texas kidneywood, coyotillo, lotebush, guayacan, desert yaupon, mesquite, littleleaf sumac, cenizo, shrubby blue sage, narrow-leaf elbowbush, Berlandier croton, ephedra, knifeleaf condalia, pricklypear, and tasajillo make up the remaining 10 percent.

The brush canopy remained moderate because the relatively low grass production was not enough to fuel the range fires that would have kept the canopy more open.

Deterioration of the plant community occurs as the site is heavily and continuously grazed. As the range deteriorates, silver blue stem, tanglehead, Arizona cottontop, and most palatable perennial forbs are grazed out of the plant community. These plants are initially replaced by plains bristlegrass, pink pappusgrass, hooded windmillgrass, sand dropseed, slender grama, fall witchgrass, less palatable forbs, and an increased growth of shrubs.

Eventually, as heavy use of the range continues, the understory consists mainly of perennial threeawn, slim tridens, hairy tridens, red grama, red lovegrass, sandbur, gummy lovegrass, Hall's panicum, and many unpalatable perennial and annual forbs. In the absence of competition from strong perennial grasses and with no periodic range fires, the shrub canopy becomes dense.

At this stage of range deterioration, significantly large areas are bare, and the soil begins to crust. Because of the crusting, less water is absorbed by the soil and more water runs off the soil. Thus, there is an increased hazard of erosion.

Shallow Ridge 20 to 25" PZ

This group includes soil mapping units: MgD—Mirasol gravelly sandy loam, 1 to 8 percent slopes; OmD—Olmedo very gravelly loam, 1 to 8 percent slopes; and ScD—Sancajo very gravelly loam, 1 to 8 percent slopes.

This site occurs on low ridges and plains with slopes from 1 to 8 percent. These soils are gravelly loams and calcareous clay loams that contain varying amounts of fractured caliche fragments and stones formed over indurated caliche at depths of less than 20 inches. Erosion susceptibility is moderate and runoff rates are commonly high. Because of shallow depth, moisture storage is low, which makes this a droughty, low producing site.

The historic climax plant community on this site is a semi-open chaparral or shrubland that has an understory of mid and shortgrasses. Species composition by weight is about 85 percent grasses, 5 percent forbs, and 10 percent woody plants.

About 25 percent of the climax plant community is Arizona cottontop and pink pappusgrass. About 15 percent is tanglehead, green sprangletop, and bush muhly; 10 percent is silver bluestem; 10 percent is plains bristlegrass; 5 percent is lovegrass tridens, perennial threeawn, hairy grama, and Texas bristlegrass. About 5 percent of the climax production consists of forbs, including orange zexmania, skeletonleaf goldeneye, bushsunflower, halfshrub sundrop, menodora, and Dutchman's breeches, and some annual forbs.

Woody plants make up about 10 percent of the climax condition because of relatively low grass production. The low amount of vegetation in most years was not enough to fuel frequent range fires that would have kept the canopy more open.

Deterioration of the climax plant community occurs as the site is subjected to heavy and continuous grazing. As the range deteriorates, Arizona cottontop, tanglehead, green sprangletop, bush muhly, lovegrass tridens, plains lovegrass, and the most palatable forbs decrease and are eventually grazed out. These plants are initially replaced by pink pappusgrass, plains bristlegrass, silver bluestem, and some of the less palatable forbs. With continued heavy grazing, the plant community is dominated by threeawn, fall witchgrass, hairy grama, slim tridens, unpalatable forbs, and an abundance of shrubs or brush.

In the final stages of range deterioration, much of the ground is bare, and the soil is unpalatable grasses and forbs of very low quality that are susceptible to erosion. In addition to the low brush, which dominates the range site.

Wildlife Habitat

Garry Stephens, Zone Biologist, NRCS prepared this section.

Wildlife is an extremely important resource in McMullen County. Most of the land in the county will support wildlife and is leased for hunting or is used by the landowners for hunting.

Improvement and manipulation of habitat for game species has been given special emphasis in the county. The major wildlife species include white-tailed deer, javelina, bobwhite quail, scaled quail, white-winged dove, mourning dove, and Rio Grande turkey. In some locations, feral hogs are numerous. Fox, raccoon, badger, skunk, opossum, armadillo, cottontail rabbit, jackrabbit, squirrel, bats, and numerous rodents also inhabit the county. The common predators are coyote and bobcat along with an occasional mountain lion.

Intensive management of deer herds to produce quality bucks is becoming quite common. Many ranches use high fences to assist with control of deer numbers.

The successful management of wildlife requires the proper combination of food, cover, and water. A lack of any one of these elements, an unfavorable balance among them, or an inadequate distribution of them can eliminate or severely limit a desired kind of wildlife in an area. Information about soils is helpful in creating, improving, or maintaining suitable food, cover, and water for wildlife.

Most wildlife habitat is created or managed by planting suitable vegetation (fig. 20), by increasing the extent of existing vegetation, or improving its quality, or by a combination of these measures. The influence that most soils have on plants is known or can be inferred from knowledge of soil characteristics. Soil information is also useful in selecting sites for creating or improving water areas for wildlife.

Proper management of wildlife habitat is important. Areas of grain sorghum provide food for quail, turkey, and dove. Small grain crops can provide food for deer, geese, and sand hill cranes if suitable cover is nearby. Leaving crop residues on the surface can provide food for numerous species of wildlife. Cover can be provided by leaving brush in fence rows. Disking field borders can greatly improve the food supply available in pastures. Brush left in selected locations provides food and cover for both birds and mammals.

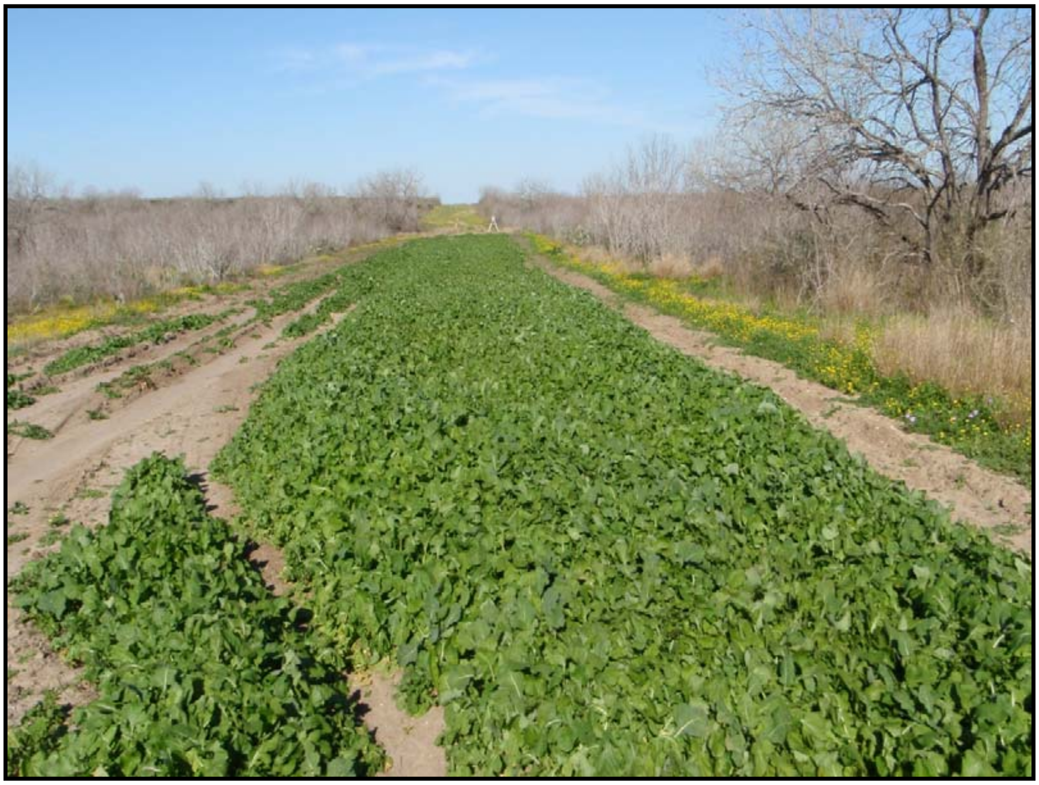

Figure 20.—A wildlife foot plot on an area of Brennan fine sandy loam, 0 to 3 percent slopes. Supplemental food, such as turnip greens pictured above, can provide wildlife additional food sources.

Proper management of habitat for rangeland wildlife includes several rangeland management practices. Prescribed grazing, including proper stock numbers and rest from grazing can increase the food supply available to wildlife. A good herbaceous cover can provide cover for quail and turkey and fawning areas for deer. If allowed to mature, many grasses and native forbs will provide seed for dove, quail, and turkey. Proper brush management can be extremely important for wild species. If brush is cleared or manipulated in strips (fig. 21), blocks, or other patterns, a much more diverse food source and habitat is created for various species of wildlife. Other measures that can improve wildlife habitat include disking, burning, planting food plots, range planting, and establishment of water sources.

In Table 12, table 13, table 14, table 15, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The elements of wildlife habitat are described in the following paragraphs:

Ratings for *grain and seed crops for food and cover* is to be used in planning the production of nonirrigated commercial grain and other seed or vegetative producing annuals for wildlife food and cover. The annual vegetation species that are selected are usually planted at least once each year. The use of annual tillage may increase the potential for soil erosion and, therefore, the use of conservation practices is required to minimize the hazard. If appropriate, the soils may receive supplemental fertilization and liming to increase vegetation growth rates and seed production. Depending upon the

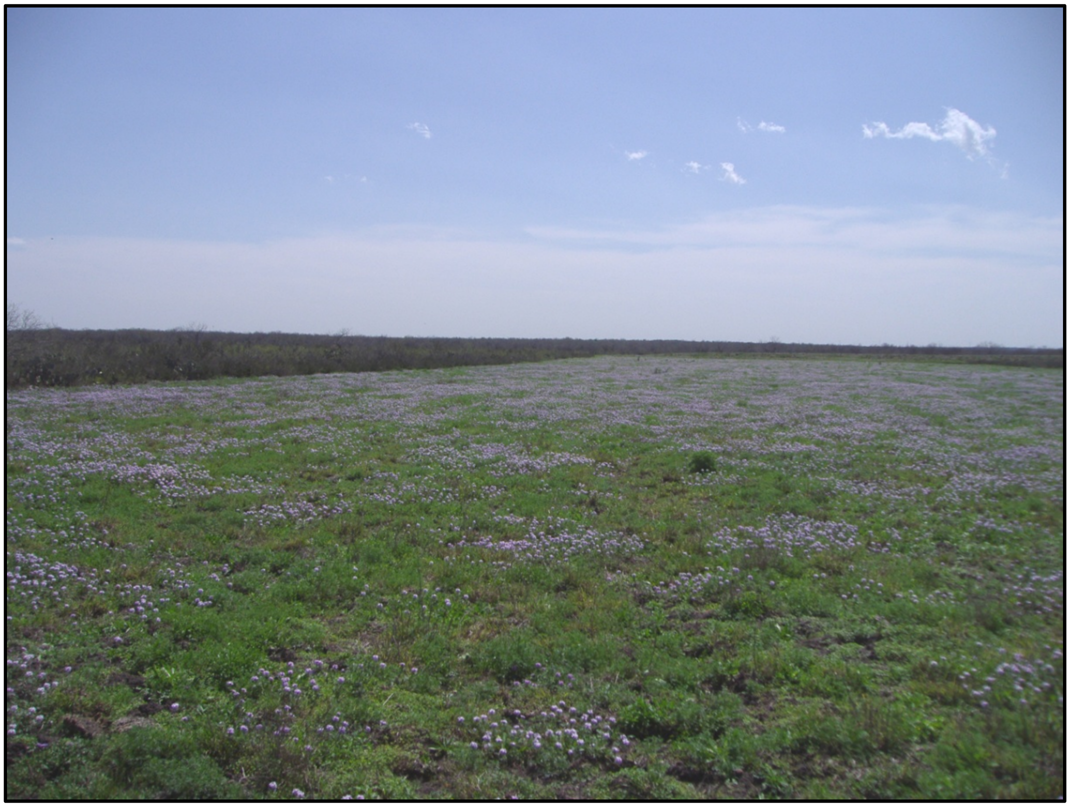

Figure 21.—Cleared strips on an area of Montell clay, 0 to 3 pecent slopes. Brush management is a key element to wildlife management. The native brush is typically cleared in strips to provide a diverse food source and source of wildlife habitat for different species.

objectives of the user, the plant species selection and management techniques will dictate whether the habitat will be dominantly used for food, cover, or both. The height and structure of the vegetation species are important considerations in addressing wildlife cover relationships.

The final selection of a site and suitable annual vegetation species for use in providing food and cover for wildlife is determined by the limitation of the soil such as how it influences plant establishment, survival, growth, and vigor. The guide identifies the soil restricting features that will have the most affect on annual vegetation species as habitat.

The table provides limitation ratings and identify the dominate soil characteristics that limit the site for growing grain and seed corps. They allow the user to plan and develop alternatives in site selection and to select the grain and seed species that best meet the wildlife habitat requirements. The user is required to develop a list of locally adapted annual cover, grain, and seed species. Examples of grain and seed crops are corn, milo, wheat, and oats.

Soils that are *not limited* have no restrictions to use and are favorable for locally adapted annual vegetation species that are used for wildlife habitat. Adapted species may be grown individually or in combination with other adapted species. A *somewhat limited* rating implies that the site has limitations for the growth of climatically adapted vegetation species and these restrictive features may limit the full potential of plant growth. A *not limited* rating indicates that the soil characteristics are such that they limit establishment, growth, maintenance, or performance and, thus, affect the value of the grain and seed crop as food or cover for wildlife habitat.

The soil properties and qualities important in the design and management of grain and seed crops for food and cover are surface texture, organic matter content, rock fragment, depth, available water holding capacity, wetness, ponding, flooding, permeability, slope, salts, sodium adsorption ratio, and susceptibility to erosion. The soil properties and qualities that influence installation are depth, flooding, and ponding. The features that affect performance of the system and plant growth are salinity, sodium adsorption ratio, and available water holding capacity.

Ratings for *domestic grasses and legumes for food and cover for wildlife habitat* can be used in planning the production of nonirrigated domestic grass and legume vegetation for wildlife food and cover. The species selected are generally perennial and include some common annuals. They are self-perpetuating after the initial stand establishment and thus will tend to minimize the long-term risk of soil erosion. Tillage may increase the potential for soil erosion during stand establishment, and conservation practices may be required to minimize the hazard. If appropriate, the soils may receive supplemental fertilization and liming to increase vegetation growth rates for the production of vegetative food and cover. Depending upon the objectives of the user, the plant species selection and management techniques will dictate whether the habitat will be dominantly used for food, cover, or both. The height and structure of the vegetation species are important considerations in addressing wildlife cover relationships.

The final selection of a site suitable for domestic grass and legume species for use in providing food and cover for wildlife is determined by the limitation of the soil, such as how it influences plant establishment, survival, growth, and vigor. The guide identifies the soil restricting features that will have the most affect on grass and legume species as habitat. Examples of grasses and legumes are kleingrass, blue panicum, Wilman lovegrass, “Bee-wild” bundleflower, and bur clover.

The table provides limitation ratings and identifies the dominate soil characteristics that limits the site for growing grass and/or legumes. It allows the user to plan and develop alternatives in site selection and to select the grass or legume species, or a combination of both species that best meets the wildlife habitat requirements. The user is required to develop a list of locally adapted domestic grass and legume species.

Soils that are rated *not limited* have no limitations and are favorable for locally adapted domestic grass and legume species that are used as wildlife habitat. Adapted species may be grown individually or in combination with other adapted species. A *somewhat limited* rating implies that the site has restrictions for the growth of climatically adapted plants for habitat and some restrictive features may limit the full potential of plant growth. These conditions may restrict the selection for some of the adapted species to be grown individually or in combination with other adapted species. A *very limited* rating indicates that the soil characteristics are such that they limit establishment, growth, maintenance, or performance and thus affect the value of grass and legume species as food or cover for wildlife habitat.

The soil properties and qualities important in the design and management of domestic grasses and legumes for food and cover for wildlife habitat, are surface texture, organic matter content, rock fragment, depth, available water holding capacity, wetness, ponding, flooding, permeability, slope, salts, sodium adsorption ratio, and susceptibility to erosion. The soil properties and qualities that influence installation are depth, flooding, and ponding. The features that affect performance of the system and plant growth are salinity, sodium adsorption ratio, and available water holding capacity.

Ratings for *irrigated grain seed crops for food and cover* can be used in planning the production of irrigated seed crops for wildlife food and cover. The annual species selected are usually planted at least once each year. Tillage and irrigation during the growing season may increase the potential for soil erosion. To minimize the risk of erosion, the use of conservation practices is required. If appropriate, the soils may receive supplemental fertilization and liming to increase vegetation and seed production. Depending upon the objectives of the manager, the plant species selection and management techniques will dictate whether the habitat will be dominantly used for food, cover, or both. The height and structure of the plant species are important considerations in addressing wildlife cover relationships.

The final selection of a site suitable for irrigated crops for use in providing food and cover for wildlife is determined by the limitation of the soil, such as how it influences plant establishment, survival, growth, and vigor. The guide identifies the soil restricting features that will have the most effect on annual plant species as habitat.

The table provides limitation ratings and identifies the dominant soil characteristics that limit the site for growing irrigated grain and seed crops. They allow the manager to plan and develop alternatives in site selection and irrigation system and to select the grain and seed species that best meet the wildlife habitat requirements. The manager is required to develop a list of locally adapted annual cover, grain, and seed species. Examples of irrigated grain and seed crops are corn, wheat, oats, and grain sorghum.

Soils that are *not limited* have no restrictions to irrigated use and are favorable for locally adapted grain and seed crops that are used as wildlife habitat. Adapted species may be grown individually or in combination with other adapted species. A *somewhat limited* rating implies that the site has restrictions for irrigation and the growth of climatically adapted plant species and some restrictive features may limit the full potential of plant growth. A *very limited* rating indicates that the soil characteristics are such that they limit establishment, growth, maintenance, or performance and thus affect the value of the grain and seed crop as food or cover for wildlife habitat.

The soil properties and qualities important in the design and management of irrigated grain seed crops for food and cover, are surface texture, organic matter content, rock fragment, depth, available water holding capacity, wetness, ponding, flooding, permeability, slope, salts, sodium adsorption ratio, and susceptibility to erosion. The soil properties and qualities that influence installation are depth, flooding and ponding. The features that affect performance of the system and plant growth are salinity, sodium adsorption ratio, and available water holding capacity.

Ratings for *irrigated domestic grasses and legumes for food and cover* can be used in planning the production of irrigated domestic grass and legume vegetation for wildlife food and cover. The species selected are generally perennial and include some common annuals. They are self-perpetuating after the initial stand establishment and thus tend to minimize the long-term risk of soil erosion. Tillage and irrigation during stand establishment increase the potential for soil erosion. To minimize the risk of erosion, the use of conservation practices is required. If appropriate, the soils may receive supplemental fertilization and liming to increase vegetation growth rates for the production of vegetative food and cover. Depending upon the objectives of the user, the plant species selection and management techniques will dictate whether the habitat will be dominantly used for food, cover, or both. The height and structure of the vegetation species are important considerations in addressing wildlife cover relationships.

The final selection of a site suitable for irrigation and of domestic grass and legume species for use in providing food and cover for wildlife is determined by the limitation of the soil, such as how it influences plant establishment, survival, growth, and vigor. The guide identifies the soil restricting features that will have the most affect on grass and legume species as habitat.

The table provides limitation ratings and identifies the dominant soil characteristics that limit the site for growing irrigated grass and/or legumes. They allow the user to plan and develop alternatives in site selection and irrigation system requirements and to select the grass, or legume species, or a combination of both species that best meets the wildlife habitat requirements. The user is required to develop a list of locally adapted domestic grass and legume species. Examples of irrigated domestic grasses and legumes for food and cover are coastal bermudagrass, bufflegrass, kleingrass, blue panicum, sorghum alum, peas, clover, and vetch.

Soils that are rated *not limited* have no restrictions for irrigated use and are favorable for locally adapted domestic grass and legume species that are used as wildlife habitat. Adapted species may be grown individually or in combination with other adapted species. A *somewhat limited* rating implies that the site has restrictions for irrigation and the growth of climatically adapted vegetation species and some restrictive features may limit the full potential of plant growth. These conditions may restrict the selection for some of the adapted species to be grown individually or in combination with other adapted species. A *very limited* rating indicates that the soil characteristics are such that they limit irrigation, establishment, growth, maintenance, or performance and thus affect the value of grass and legume species as food or cover for wildlife habitat.

The soil properties and qualities important in design and management of irrigated domestic grasses and legumes for food and cover are surface texture, organic matter content, rock fragment, depth, available water holding capacity, wetness, ponding, flooding, permeability, slope, salts, sodium adsorption ratio, and susceptibility to erosion. The soil properties and qualities that influence installation are depth, flooding, and ponding. The features that affect performance of the system and plant growth are salinity, sodium adsorption ratio, and available water holding capacity.

Ratings for *burrowing mammals and reptiles* shows the soil as a habitat component according to its potential to be used by mammals and specific species of reptiles that excavate burrows. Burrows are considered a necessary part of specific local habitat requirements for certain targeted and non-targeted species of wildlife. The interpretation is intended to provide guidelines in the identification and selection of sites that have the most potential for preserving, maintaining, or increasing local populations of these species. Site identification of problem areas for control of pests, such as moles and ground squirrels is also another potential application of this guide.

The table is general in nature and identifies that dominate soil characteristics that limit the site for burrowing animals. It is designed to be used in the planning process to identify areas of concern prior to the application of conservation practices. Based upon the wildlife objectives, these areas can be avoided, practices can be adjusted to minimize damage to the burrow habitat, practices can be changed to overcome limitations by the presence of the burrows, or control measures can be used to eradicate pest species. The guide does not take into account climate or soil temperature that may influence the presence or distribution patterns of a species. The presence or absence of a species is determined at the local level.

The table identifies the dominant soil characteristics that limit the site for burrowing mammals and reptiles. This information allows the user to plan and develop alternatives in site selection by identifying the site that best meets the wildlife habitat requirements. The user is required to develop a list of locally adapted wildlife species that excavate their own burrows and that utilize abandoned burrows to meet at least part of their habitat requirements. This list may include many other mammals, reptiles, and/or bird species. Examples of burrowing mammals and reptiles are badger, armadillo, cottontail, and jackrabbit, and numerous rodents as well as the bullsnake and diamondback rattlesnake.

Soils that are rated *not limited* have no restrictions to use and are favorable for use by locally adapted animal species as wildlife habitat. Colonization and population densities may be above average if other habitat factors are not limiting. A *somewhat limited* rating implies that the site has restrictions to locally adapted animal species habitat and some restrictive features may limit the use of the site by burrowing species. Colonization and population densities may be average for the area if the other habitat requirements are met. A *very limited* rating indicates that the soil characteristics are such that they limit establishment, maintenance, or use of the site by burrowing species. Colonization and population densities may be restricted in the area because of the limiting factors even though all of the other species habitat requirements are met.

The final identification and selection of a site suitable for burrowing mammals, reptiles, and other species capable of utilizing abandoned burrows is determined by the limitation of the soil as it influences excavation, maintenance, and preservation of the burrows. The soil properties and qualities important in establishment and growth of burrowing mammals and reptiles are wetness, low sodium and salt content, surface texture, pH, ponding, slope, permeability, and high organic matter content.

Ratings for *upland native herbaceous plants* for use as wildlife habitat ranks the soil as a medium for growing a diverse upland herbaceous plant community which is adapted to soil conditions that are drier than those common in the moist riparian and wetland zones but that are not as dry as those in the upland desert areas.

The ratings are general in nature and identify the dominant soil characteristics that influence the suitability of the site for growing upland native herbaceous vegetation, either naturally or artificially established. This information allows the user to plan and develop alternatives in site selection and to identify the upland herbaceous plants that best meet the wildlife habitat requirements. It is intended to provide minimum soil restriction guidelines for the selection of sites for growing and managing adapted herbaceous plants as upland wildlife habitat and not to reflect commercial or livestock grazing values. Selection is made from a user defined list of locally adapted upland herbaceous species. Included in the list are native and introduced species, their suitability ratings, and their ability to adapt to each restrictive feature. Examples of wild herbaceous plants are bluestem, trichloris, bristlegrass, sideoats grama, western ragweed, bundleflower, and croton.

These upland herbaceous plant species are predominantly mesophytic and xerophytic and include some hydrophytic plants that are common in areas adjacent to riparian or wetland areas. The adapted vegetation components are selected to meet the specific local habitat requirements for targeted and non-targeted species of wildlife.

The management, reestablishment, or introduction of native upland herbaceous species to provide a diverse vegetation community that meets select wildlife requirements is determined by a number of factors. The factors are landscape, climate, soil, vegetation, hydrology, and time. A limitation caused by any one of these factors can influence the adaptability, survival, growth, and vigor of the herbaceous species.

Soils that are rated *not limited* have no restrictions to use and are favorable for all locally adapted upland herbaceous species that are used as wildlife habitat. A *somewhat limited* rating implies that the site has restrictions for the establishment or growth of climatically adapted upland herbaceous species for habitat and some restrictive features may limit their full potential for plant growth. A *very limited* rating indicates that the soil characteristics are such that they limit establishment, growth, maintenance, or performance and thus affect the value of the upland herbaceous vegetation as wildlife habitat. Existing tree and shrub cover should not influence the ratings.

The soil properties and qualities important in the design and management of upland native herbaceous plants, are soil temperature, available water holding capacity, wetness, coarse fragments in the surface, salts, moisture regime, and surface clay or sand content. The features that affect performance of the system and plant growth are salinity, wetness, and available water holding capacity.

Ratings for *upland shrubs and vines* rate the soil as a medium for growing a diverse upland shrub and vine community. The plants are adapted to soil conditions that are drier than those common in the moist riparian and wetland zones but that are not as dry as those in the upland desert area.

These upland shrub and vine plant species are predominantly mesophytic and xerophytic and include some hydrophytic plants that are common in areas adjacent to riparian or wetland areas. The adapted vegetation components are selected to meet the specific local food and cover habitat requirements for targeted and nontargeted species of wildlife. Examples of shrubs are Texas kidneywood, lotebush, guayacan, blackbrush acacia, brazil, and spiny hackberry.

The upland shrubs and vines ratings are intended to provide minimum soil restriction guidelines for the selection of sites for growing and managing upland shrubs and/or vines as wildlife habitat and not to reflect commercial or livestock grazing value.

This table provides generalized ratings and identifies the dominant soil characteristics that limit the site for growing upland shrub and/or vine vegetation, either naturally or artificially established. This information allows the user to plan and develop alternatives in site selection and to identify the upland shrubs and vines that best meet the wildlife habitat requirements. Selection is made from a list of locally adapted upland shrub and vine species. Included in the list are native and introduced species, their suitability ratings, and their ability to adapt to each restrictive feature.

Soils that are rated *not limited* have no use restrictions and are favorable for all locally adapted upland shrub and vine species that are used as wildlife habitat. A *somewhat limited* rating implies that the site has restrictions for the establishment or growth of climatically adapted upland shrub and vine species for habitat and some restrictive features may limit their full potential for plant growth. A *very limited* rating indicates that the soil characteristics are such that they limit establishment, growth, maintenance, or performance and thus affect the value of the upland shrub and vine vegetation as wildlife habitat. Existing tree cover should not influence the rating.

The management, reestablishment, or introduction of introduced or native upland shrub and vine species to provide a diverse vegetation community that meets select wildlife requirements is determined by a number of factors. These factors are landscape, climate, soil, vegetation, hydrology, and time. A limitation caused by any one of these factors can influence the adaptability, survival, growth, and vigor of the woody species. This interpretation addresses only those factors that relate primarily to the soil. It identifies the limitation and the soil restricting features that will have the most affect on the use of upland shrub and vine vegetation as wildlife habitat.

The soil properties and qualities important in the design and management of upland shrubs and vines are surface texture, organic matter content, rock fragment, depth, available water holding capacity, wetness, salts, sodium adsorption ratio, and extreme climatic conditions.

Ratings for *riparian herbaceous plants* for use as wildlife habitat shows the soil as a medium for growing herbaceous plants which are adapted to soil conditions that are wetter than those common in the drier upland areas. The soils suitable for this habitat generally occur along flood plains, depressions, bottom lands, and drainages adjacent to ephemeral, intermittent, or perennial streams. They are either saturated with water for some period during the year or are subject to periodic overflow from ponding or flooding. Stream scouring and material deposition on flood plains are common. The natural regeneration of many plant species may be dictated by the timing of stream, peak flow events.

These herbaceous plant species are predominantly hydrophytic commonly and include some mesophytic plants. The adapted vegetation components are selected to meet the specific local habitat requirements for targeted and non-targeted species of wildlife. The guide is intended to provide minimum guidelines for the selection of sites for growing and managing herbaceous plants as riparian wildlife habitat and not to reflect commercial or livestock grazing values. Examples of riparian herbaceous plants are smartweed, wild millet, saltgrass, gulf cordgrass, rushes, and sedges.

The ratings are general in nature and identify the dominant soil characteristics that influence the suitability of the site for growing herbaceous riparian vegetation. This information allows the user to plan and develop alternatives in site selection and to identify the herbaceous riparian species that best meet the wildlife habitat requirements. Selection is made from a list of locally adapted herbaceous riparian species. Included in the list are native and introduced species, their suitability ratings, and their ability to adapt to each restrictive feature.

Soils that are rated *not limited* have no restrictions to use and are favorable for all locally adapted herbaceous riparian species that are used as wildlife habitat. A *somewhat limited* rating implies that the site has restrictions for the establishment or growth of climatically adapted herbaceous riparian species for habitat and some restrictive features limit their full potential of plant growth. A *very limited* rating indicates that the soil characteristics are such that they limit establishment, growth, maintenance, or performance and thus affect the value of the herbaceous riparian vegetation as wildlife habitat.

The management, reestablishment, or introduction of herbaceous riparian species to meet select wildlife habitat requirements is determined by a number of factors. The factors are landscape, climate, soil, vegetation, hydrology, and time. A limitation caused by any one of these factors can influence the adaptability, survival, growth, and vigor of the herbaceous species. The guide addresses only those factors that relate primarily to the soil. It identifies the limitation and the soil restricting features that will have the most affect on the use of herbaceous riparian vegetation as wildlife habitat.

Ratings for *riparian shrubs, vines, and trees* shows the soil as a medium for growing shrubs, vines, and trees that are adapted to soil conditions that are wetter than those common in the drier upland areas.

The soils suitable for this habitat generally occur along flood plains, depressions, bottom lands, and areas adjacent to springs and seeps. They are either saturated with water for some period during the year or are subject to periodic overflow from ponding or flooding. The natural regeneration of many species may be dictated by the timing of stream, peak flow events. The information in the table is intended to provide minimum soil restriction guidelines for the selection of sites for growing and managing riparian shrubs, vines, and trees as wildlife habitat and not to reflect commercial or livestock grazing values.

The ratings are general in nature and identify the dominant soil characteristics that limit the site for growing woody riparian vegetation. This information allows the user to plan and develop alternatives in site selection and identify the adapted woody riparian species that best meet the wildlife habitat requirements. The user is required to develop a list of locally adapted woody riparian shrub, vine, and tree species. Included in the list are native or introduced species, their suitability ratings, and their ability to adapt to each restrictive feature. Examples of riparian shrubs, vines, and trees are retama, hackberry, pecan and large mesquite, and weesatche.

Soils that are rated *not limited* have no restrictions to use and are favorable for all locally adapted woody riparian vegetation that are used as wildlife habitat. A *somewhat limited* rating implies that the site has restrictions for the establishment or growth of climatically adapted woody riparian species for habitat and some restrictive features may limit their full potential of plant growth. A *very limited* rating indicates that the soil characteristics are such that they limit establishment, growth, maintenance, or performance and thus affect the value of the woody riparian vegetation as wildlife habitat.

The introduction of woody riparian species or their reestablishment to meet select wildlife habitat requirements is determined by a number of factors. The factors are landscape, climate, soil, vegetation, hydrology, and time. A limitation caused by any one of these factors can influence the adaptability, survival, growth, and vigor of the woody species. Factors that relate primarily to the soil are shown as well as the limitation and the soil restricting features that will have the most affect on the use of woody riparian vegetation as wildlife habitat. These factors include available water holding capacity, wetness, depth, sodium and salt content, and temperature extremes and dry climates.

Ratings for *freshwater wetland plants* for use as wildlife habitat shows the soil as a medium for growing wetland herbaceous vegetation and shrubs that are adapted to wet soil conditions. Floating or submerged aquatics are excluded from use in this guide. The soils suitable for this habitat generally occur adjacent to springs, seeps, depressions, bottom lands, marshes, or the backwater areas of flood plains, such as oxbow lakes, that are not directly affected by moving floodwaters. Many areas are ponded for some period of time because of the accumulation of excessive moisture caused by runoff from the surrounding area.

These plant species are predominantly hydrophytic and commonly include some mesophytic plants. The regeneration of plant species is normally through natural progression. The introduction of exotic species to enhance the habitat is an infrequent occurrence usually because of wet soil conditions during the period of optimum planting. Generally, management is better directed towards enhancing or propagating existing species that are adapted to the soil conditions of the site and that meet a desired habitat need. The adapted vegetation components are selected to meet specific local habitat requirements for targeted and non-targeted species of wildlife. The interpretation is intended to provide minimum guidelines for the selection of sites for growing freshwater wetland plants as wildlife habitat and not to reflect commercial or livestock grazing values.

Ratings are general in nature and identify the dominant soil characteristics that restrict the site for growing freshwater wetland vegetation. This information allows the user to identify the freshwater wetland species that best meet the wildlife habitat requirements. Selection is made from a list of locally adapted wetland species. Included in the list are native and introduced species, their suitability ratings, and their ability to adapt to each restrictive feature. Examples of freshwater wetland plants are smartweed, wild millet, cordgrass, rushes, and sedges.

Soils that are rated *not limited* have no restrictions to use and are favorable for all locally adapted freshwater wetland vegetation that are used as wildlife habitat. A *somewhat limited* rating implies that the site has restrictions for the establishment or growth of climatically adapted freshwater wetland species for habitat and some restrictive features limit their full potential of plant growth. A *very limited* rating indicates that the soil characteristics are such that they limit establishment, growth, maintenance, or performance and thus affect the value of the freshwater wetland vegetation as wildlife habitat.

The management, reestablishment, or introduction of freshwater wetland species to meet select wildlife habitat requirements is determined by a number of factors. The factors are landscape, climate, soil, vegetation, hydrology, and time. A limitation caused by any one of these factors can influence the adaptability, survival, growth, and vigor of the freshwater wetland species. Factors that relate primarily to the soil are shown as well as the limitation and the soil restricting features that will have the most affect on the use of freshwater wetland plants as wildlife habitat.

Recreation

Choke Canyon State Park is outside of Calliham and about 16 miles east of Tilden. It was opened to the public in 1987 and provides an excellent recreation area for locals and tourist who enjoy swimming, hiking, bird watching, picnicking, boating, and fishing.

Abundant wildlife can be found in the park and hunting and fishing is allowed with the proper license and regulations.

The James E. Daugherty Wildlife Management Area is located 4 miles north of Tilden and east off of State Highway 16 on FM 3445. It is 4,400 acres in size and provides a primitive campground for persons authorized to hunt under Special permits. The refuge was established in 1981 and provides an interpretive trail, wildlife viewing, and hunting. The James E. Daughtery Wildlife Management Area is named in memory of the state game warden who was fatally injured in McMullen County while in pursuit of game law violators.

Wildlife is among the most economically important natural resources in McMullen County. South Texas is world-renown for quality deer hunts, and many game ranches in McMullen County specifically manage for maximum wildlife production. Deer, turkey, quail, dove, feral hogs, and javelina are all important game species.

The soils of the survey area are rated in table 16 and table 17 according to limitations that affect their suitability for recreation. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the recreational uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The ratings in the tables are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

The information in table 16 and table 17 can be supplemented by other information in this survey, for example, interpretations for building site development, construction materials, sanitary facilities, and water management.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The ratings are based on the soil properties that affect the ease of developing camp areas and the performance of the areas after development. Slope, stoniness, and depth to bedrock or a cemented pan are the main concerns affecting the development of camp areas. The soil properties that affect the performance of the areas after development are those that influence trafficability and promote the growth of vegetation, especially in heavily used areas. For good trafficability, the surface of camp areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The ratings are based on the soil properties that affect the ease of developing picnic areas and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of picnic areas. For good trafficability, the surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Playgrounds require soils that are nearly level, are free of stones, and can withstand intensive foot traffic. The ratings are based on the soil properties that affect the ease of developing playgrounds and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of playgrounds. For good trafficability, the surface of the playgrounds should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Paths and trails for hiking and horseback riding should require little or no slope modification through cutting and filling. The ratings are based on the soil properties that affect trafficability and erodibility. These properties are stoniness, depth to a water table, ponding, flooding, slope, and texture of the surface layer.

Off-road motorcycle trails require little or no site preparation. They are not covered with surfacing material or vegetation. Considerable compaction of the soil material is likely. The ratings are based on the soil properties that influence erodibility, trafficability, dustiness, and the ease of revegetation. These properties are stoniness, slope, depth to a seasonal high water table, ponding, flooding, and texture of the surface layer.

Golf course fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer. The suitability of the soil for traps, tees, roughs, and greens is not considered in the ratings.

Hydric Soils

In this section, hydric soils are defined and described.

The three essential characteristics of wetlands are hydrophytic vegetation, hydric soils, and wetland hydrology (Cowardin and others, 1979; U.S. Army Corps of Engineers, 1987; National Research Council, 1995; Tiner, 1985). Criteria for each of the characteristics must be met for areas to be identified as wetlands. Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). These soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 1995). The criteria are used to identify a phase of a soil series that normally is also a hydric soil. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2003) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period to be considered hydric, they generally exhibit certain properties that can be observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils in this survey area are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and others, 1998).

Information regarding hydric soils in the soil survey area, can be found on the internet at http://soildatamart.nrcs.usda.gov or the local office of the Natural Resources Conservation Service.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the data in the tables described under the heading "Soil Properties."

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site-specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about particle-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 7 feet of the surface, soil wetness, depth to a water table, ponding, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. Table 18 and table 19 show the degree and kind of soil limitations that affect dwellings with and without basements, small commercial buildings, local roads and streets, shallow excavations, and lawns and landscaping.

Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Dwellings are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential) and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Small commercial buildings are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential) and compressibility (which is inferred from the Unified classification). The properties that affect the ease and amount of excavation include flooding, depth to a water table, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt) rigid material (concrete) or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number) subsidence, linear extensibility (shrink-swell potential) the potential for frost action, depth to a water table, and ponding.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

Lawns and landscaping require soils on which turf and/or ornamental trees and shrubs can be established and maintained. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer.

Sanitary Facilities

Table 20 and table 21 show the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, sanitary landfills, and daily cover for landfill. The ratings are both descriptive and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 60 inches is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in down slope areas.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Considered in the ratings are slope, permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter.

Soil permeability is a critical property affecting the suitability for sewage lagoons. Most porous soils eventually become sealed when they are used as sites for sewage lagoons. Until sealing occurs, however, the hazard of pollution is severe. Soils that have a permeability rate of more than 2 inches per hour are too porous for the proper functioning of sewage lagoons. In these soils, seepage of the effluent can result in contamination of the ground water. Ground-water contamination is also a hazard if fractured bedrock is within a depth of 40 inches, if the water table is high enough to raise the level of sewage in the lagoon, or if floodwater overtops the lagoon.

A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor. If the lagoon is to be uniformly deep throughout, the slope must be gentle enough and the soil material must be thick enough over bedrock or a cemented pan to make land smoothing practical.

A *trench sanitary landfill* is an area where solid waste is placed in successive layers in an excavated trench. The waste is spread, compacted, and covered daily with a thin layer of soil excavated at the site. When the trench is full, a final cover of soil material at least 2 feet thick is placed over the landfill. The ratings in the table are based on the soil properties that affect the risk of pollution, the ease of excavation, trafficability, and revegetation. These properties include permeability, depth to bedrock or a cemented pan, depth to a water table, ponding, slope, flooding, texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, onsite investigation may be needed.

Hard, nonrippable bedrock, creviced bedrock, or highly permeable strata in or directly below the proposed trench bottom can affect the ease of excavation and the hazard of ground-water pollution. Slope affects construction of the trenches and the movement of surface water around the landfill. It also affects the construction and performance of roads in areas of the landfill.

Soil texture and consistence affect the ease with which the trench is dug and the ease with which the soil can be used as daily or final cover. They determine the workability of the soil when dry and when wet. Soils that are plastic and sticky when wet are difficult to excavate, grade, or compact and are difficult to place as a uniformly thick cover over a layer of refuse.

The soil material used as the final cover for a trench landfill should be suitable for plants. It should not have excess sodium or salts and should not be too acid. The surface layer generally has the best workability, the highest content of organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

In an *area sanitary landfill*, solid waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site. A final cover of soil material at least 2 feet thick is placed over the completed landfill. The ratings in the table are based on the soil properties that affect trafficability and the risk of pollution. These properties include flooding, permeability, depth to a water table, ponding, slope, and depth to bedrock or a cemented pan.

Flooding is a serious problem because it can result in pollution in areas downstream from the landfill. If permeability is too rapid or if fractured bedrock, a fractured cemented pan, or the water table is close to the surface, the leachate can contaminate the water supply. Slope is a consideration because of the extra grading required to maintain roads in the steeper areas of the landfill. Also, leachate may flow along the surface of the soils in the steeper areas and cause difficult seepage problems.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste. The ratings in the table also apply to the final cover for a landfill. They are based on the soil properties that affect workability, the ease of digging, and the ease of moving and spreading the material over the refuse daily during wet and dry periods. These properties include soil texture, depth to a water table, ponding, rock fragments, slope, depth to bedrock or a cemented pan, reaction, and content of salts, sodium, or lime.

Loamy or silty soils that are free of large stones and excess gravel are the best cover for a landfill. Clayey soils may be sticky and difficult to spread; sandy soils are subject to wind erosion.

Slope affects the ease of excavation and of moving the cover material. Also, it can influence runoff, erosion, and reclamation of the borrow area.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. It should not have excess sodium, salts, or lime and should not be too acid.

Construction Materials

Table 22 and table 23 provide information about the soils as potential sources of gravel, sand, topsoil, reclamation material, and roadfill. Normal compaction, minor processing, and other standard construction practices are assumed.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 22, only the likelihood of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material. The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the Unified classification of the soil) the thickness of suitable material, and the content of rock fragments. If the bottom layer of the soil contains sand or gravel, the soil is considered a likely source regardless of thickness. The assumption is that the sand or gravel layer below the depth of observation exceeds the minimum thickness.

The soils are rated *good, fair*, or *poor* as potential sources of sand and gravel. A rating of *good* or *fair* means that the source material is likely to be in or below the soil. The bottom layer and the thickest layer of the soils are assigned numerical ratings. These ratings indicate the likelihood that the layer is a source of sand or gravel. The number 0.00 indicates that the layer is a *poor* source. The number 1.00 indicates that the layer is a good source. A number between 0.00 and 1.00 indicates the degree to which the layer is a likely source.

The soils are rated *good, fair*, or *poor* as potential sources of topsoil, reclamation material, and roadfill. The features that limit the soils as sources of these materials are specified in the tables. The numerical ratings given after the specified features indicate the degree to which the features limit the soils as sources of topsoil, reclamation material, or roadfill. The lower the number, the greater the limitation.

Reclamation material is used in areas that have been drastically disturbed by surface mining or similar activities. When these areas are reclaimed, layers of soil material or unconsolidated geological material, or both, are replaced in a vertical sequence. The reconstructed soil favors plant growth. The ratings in the table do not apply to quarries and other mined areas that require an offsite source of reconstruction material. The ratings are based on the soil properties that affect erosion and stability of the surface and the productive potential of the reconstructed soil. These properties include the content of sodium, salts, and calcium carbonate; reaction; available water capacity; erodibility; texture; content of rock fragments; and content of organic matter and other features that affect fertility.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the whole soil, from the surface to a depth of about 5 feet. It is assumed that soil layers will be mixed when the soil material is excavated and spread.

The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and the performance of the material after it is in place. The thickness of the suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the AASHTO classification of the soil) and linear extensibility (shrink-swell potential).

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area. The ratings are based on the soil properties that affect plant growth; the ease of excavating, loading, and spreading the material; and reclamation of the borrow area. Toxic substances, soil reaction, and the properties that are inferred from soil texture, such as available water capacity and fertility, affect plant growth. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock or a cemented pan, and toxic material.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 24 provides information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The ratings are both descriptive and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. Not limited indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. Somewhat limited indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. Very limited indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Pond reservoir areas (fig. 22) hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. Embankments that have zoned construction (core and shell) are not considered. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

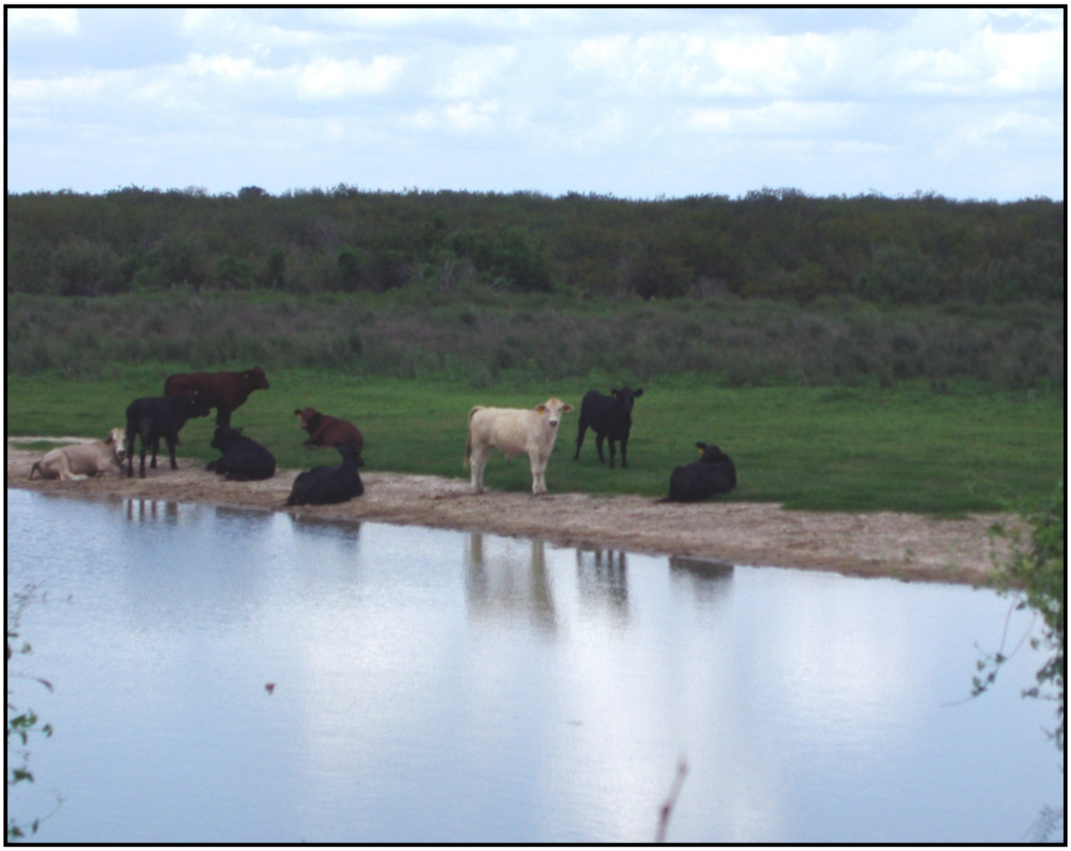

Figure 22.—A pond on an area of Tela sandy clay loam, 0 to 2 percent slopes, flooded. These ponds are extremely important not only to cattle, but also to wildlife.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine particle-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties are shown in tables. They include engineering soil properties, physical and chemical properties, and pertinent soil and water features.

Engineering Soil Properties

Table 25 provides the engineering classifications and the range of index properties for the layers of each soil in the survey area.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters across. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2001) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2000).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches across and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches across is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2 4, A-2 5, A-2 6, A-2 7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches across and 3 to 10 inches across are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches across based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series) have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of particle-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is generally omitted in the table.

Physical Soil Properties

Table 26 shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Particle-size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle-sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In table 26, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of clay affects the physical behavior of a soil. Particle-size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3-or 1/10-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

*Permeability (*K-sat*)* refers to the ability of a soil to transmit water or air. The term "permeability," as used in soil surveys, indicates saturated hydraulic conductivity (K-sat). The estimates in the table indicate the rate of water movement, in inches per hour, when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at 1/3-or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 26, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained by returning crop residue because of the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in table 26 as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of several factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.

8. Soils that are not subject to wind erosion because of rock fragments on the surface or because of surface wetness.

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Chemical Soil Properties

Table 27 shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable bases that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Soil reaction is a measure of acidity or alkalinity. The pH of each soil horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

Gypsum is expressed as a percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water. Soils that have a high content of gypsum may collapse if the gypsum is removed by percolating water.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter (mmhos/centimeters) or decisiemens per meter (dS/m) at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Sodium adsorption ratio (SAR) is a measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. Soils that have SAR values of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced permeability and aeration, and a general degradation of soil structure.

Water Features

Table 28 provides estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Surface runoff refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are negligible, very low, low, medium, high, and very high.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

Water table refers to a saturated zone in the soil. Table 28 indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely gray colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. Table 28 indicates *surface water depth* and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered is local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Soil Features

Table 29 provides estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low, moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1998 and 1999). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 30 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in sol. An example is Mollisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Ustoll (Ust, meaning burnt, plus oll, from Mollisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplustolls (Hapl, meaning minimal horizonation, plus ustolls, the suborder of the Mollisols that has an ustic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective Aridic identifies the subgroup that typifies the great group. An example is Aridic Calciustolls.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineralogy class, cation-exchange activity class, soil temperature regime, soil depth, and reaction class. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is Fine-loamy, mixed, superactive, hyperthermic Aridic Calciustolls.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. An example is Houla.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (Soil Survey Division Staff, 1993). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (Soil Survey Staff, 1999) and in "Keys to Soil Taxonomy" (Soil Survey Staff, 1998). Unless otherwise indicated, colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the series.

Aguilares Series

Depth class: Very deep
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.6 to 2.0 in/hr (moderate)
Landscape: Inland, dissected coastal plains
Landform: Interfluves
Parent material: Calcareous loamy residuum weathered from sandstone
Slope: 0 to 3 percent
Elevation: 190 to 600 feet
Mean annual precipitation: 19 to 22 inches
Mean annual air temperature: 72 to 73 degrees F
Frost-free period: 280 to 325 days

Taxonomic Class

Fine-loamy, mixed, superactive, hyperthermic Aridic Calciustepts

Typical Pedon

Aguilares fine sandy loam in an area of Aguilares fine sandy loam, 0 to 3 percent slopes; Mirasol Creek, Texas USGS topographic quadrangle; Longitude: 28 degrees, 4 minutes, 54.21 seconds North; Longitude: 98 degrees, 43 minutes, 50.84 seconds West. UTM Easting: 526449 meters, UTM Northing: 3106285 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 4 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; friable, slightly hard, nonsticky, nonplastic; common very fine, common fine, and common medium roots; slight effervescence; moderately alkaline; non-saline; clear smooth boundary.

Bk—4 to 12 inches; grayish brown (10YR 5/2) sandy clay loam, dark grayish brown (10YR 4/2) moist; moderate medium angular blocky structure; friable, slightly hard, nonsticky, nonplastic; common very fine, common fine, and common coarse roots; 2 percent medium irregular carbonate masses in matrix; strong effervescence; moderately alkaline; slightly saline; clear wavy boundary.

Bkz—12 to 39 inches; light brown (7.5YR 6/3) sandy clay loam, brown (7.5YR 5/3) moist; weak coarse subangular blocky structure; firm, slightly hard, nonsticky, nonplastic; common fine roots; 7 percent medium irregular carbonate masses in matrix; strong effervescence; slightly alkaline; moderately saline; clear wavy boundary.

Bknz—39 to 51 inches; light brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 5/4) moist; weak coarse subangular blocky structure; firm, slightly hard, nonsticky, nonplastic; few very fine roots; 4 percent fine irregular carbonate masses in matrix; violent effervescence; neutral; strongly saline; clear wavy boundary.

BCknz—51 to 80 inches; pink (7.5YR 7/3) fine sandy loam, light brown (7.5YR 6/3) moist; massive; 3 percent fine threadlike carbonate masses in matrix; strong effervescence; neutral.

Range in Characteristics

Soil moisture: An aridic ustic moisture regime. The soil moisture control section is moist in some or all parts for less than 90 consecutive days in normal years. June to August and December to February are the driest months, while September to November and March to May are the wettest months.

Depth to calcic horizon: 10 to 35 inches
Depth to salt accumulations: 20 to 40 inches
CEC to clay ratio: 0.60 to 0.90
Solum thickness: 60 to 80 inches
Particle-size control section (weighted average):
  Clay content: 25 to 40 percent
  Silicate clay content: 18 to 30 percent
  Rock fragments: 0 to 15 percent within any horizon

A horizon

Hue: 10YR
Value: 4 to 6, where moist value less than 3, horizon is less than 7 inches thick
Chroma: 2 or 3
Texture: Fine sandy loam or sandy clay loam
Clay content: 10 to 30 percent
Calcium carbonate equivalent: 0 to 10 percent
EC (dS/m): 0 to 2
Gypsum: 0 to 1 percent
SAR: 0 to 2
Effervescence: Slight to strong
Reaction: Slightly alkaline or moderately alkaline

Bk horizon

Hue: 7.5YR to 2.5Y
Value: 5 to 7
Chroma: 2 to 4
Texture: Sandy clay loam or clay loam
Clay content: 20 to 40 percent total clay,
Carbonate clay: 1 to 20 percent
Pararock fragments: 0 to 5 percent
Calcium carbonate equivalent: 15 to 35 percent
Gypsum: 0 to 1 percent
EC (dS/m): Above 30 inches—1 to 4 above; below 30 inches—increasing with depth to more than 16
SAR: 10 to 40
Effervescence: Strong or violent
Reaction: Moderately alkaline

BC horizon

Hue: 7.5YR or 10YR
Value: 6 to 8
Chroma: 3 or 4
Texture: Fine sandy loam, sandy clay loam, or clay loam
Clay content: 10 to 40 percent
Carbonate clay: 1 to 20 percent
Pararock fragments: 5 to 35 percent
Calcium carbonate equivalent: 15 to 35 percent
Gypsum: 0 to 10 percent
EC (dS/m): 8 to more than 16
SAR: 10 to 40
Effervescence: Strong or violent
Reaction: Moderately alkaline

Alet Series

Depth class: Very deep
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.6 to 2.0 in/hr (moderate)
Landscape: Inland, dissected coastal plains
Landform: Drainageways
Parent material: Loamy alluvium and/or colluvium
Slope: 0 to 2 percent
Elevation: 300 to 700 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 270 to 320 days

Taxonomic Class

Fine-loamy, mixed, superactive, hyperthermic Typic Argiustolls

Typical Pedon

Alet sandy clay loam in an area of Alet sandy clay loam, 0 to 2 percent slopes, flooded; La Chusa Hill, Texas USGS topographic quadrangle; Longitude: 28 degrees, 4 minutes, 40.86 seconds North; Longitude: 98 degrees, 24 minutes, 48.37 seconds West. UTM Easting: 557631 meters, UTM Northing: 3105984 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 4 inches; very dark grayish brown (10YR 3/2) sandy clay loam, very dark gray (10YR 3/1) moist; weak fine subangular blocky structure; firm, slightly hard, slightly sticky, slightly plastic; many very fine and common fine roots; many very fine and fine interstitial and tubular pores; neutral; clear smooth boundary.

Bt1—4 to 14 inches; very dark grayish brown (10YR 3/2) sandy clay loam, very dark gray (10YR 3/1) moist; moderate fine subangular blocky structure; firm, slightly hard, slightly sticky, slightly plastic; common very fine roots; common very fine tubular pores; 20 percent distinct clay films on all faces of peds; neutral; clear smooth boundary.

Bt2—14 to 28 inches; dark yellowish brown (10YR 4/4) sandy clay loam, dark yellowish brown (10YR 3/4) moist; moderate medium subangular blocky structure; firm, slightly hard, slightly sticky, slightly plastic; common very fine roots; common very fine tubular pores; 25 percent distinct clay films on all faces of peds; slightly alkaline; gradual smooth boundary.

Bt3—28 to 49 inches; yellowish brown (10YR 5/4) sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; firm, slightly hard, slightly sticky, slightly plastic; common very fine roots; common very fine tubular pores; 15 percent distinct clay films on all faces of peds; slightly alkaline; gradual wavy boundary.

Btk1—49 to 62 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 5/3) moist; weak coarse subangular blocky structure; firm, slightly hard, slightly sticky, slightly plastic; few very fine roots; 10 percent faint clay films; 3 percent fine threadlike carbonate masses in matrix; strong effervescence; slightly alkaline; gradual wavy boundary.

Btk2—62 to 80 inches; light yellowish brown (10YR 6/4) sandy clay loam, yellowish brown (10YR 5/4) moist; weak coarse subangular blocky structure; firm, slightly hard; 10 percent faint clay films; 4 percent fine threadlike carbonate masses in matrix; strong effervescence; slightly alkaline; slightly saline.

Range in Characteristics

Soil moisture: A typic ustic moisture regime. The soil moisture control section is dry in some or all parts for more than 90 days but less than 180 cumulative days in normal years. June through August and December through February are the driest months. These soils are intermittently moist in September through November and March through May.

Depth to argillic horizon: 7 to 19 inches
Depth to secondary calcium carbonate: 25 to 50 inches
Rock fragments: 0 to 10 percent gravel

A horizon

Hue: 10YR
Value: 3 to 5
Chroma: 1 to 3
Texture: Sandy clay loam
Clay content: 20 to 25 percent
Rock fragments: 0 to 5 percent gravel
Calcium carbonate equivalent: 0 to 5 percent
EC (dS/m): 0 to 4
SAR: 0 to 2
Effervescence: None to slight
Reaction: Neutral to moderately alkaline

Bt horizon

Hue: 10YR
Value: 3 to 7
Chroma: 2 to 4
Texture: Loam, sandy clay loam, or clay loam
Clay content: 25 to 30 percent
Rock fragments: 0 to 10 percent gravel
Calcium carbonate equivalent: 0 to 5 percent
EC (dS/m): 0 to 4
SAR: 0 to 4
Effervescence: None to slight
Reaction: Neutral to moderately alkaline

Btk horizon

Hue: 7.5YR or 10YR
Value: 6 to 8
Chroma: 2 to 4
Texture: Loam, sandy clay loam, or clay loam
Clay content: 20 to 30 percent
Rock fragments: 0 to 10 percent gravel
Calcium carbonate equivalent: 5 to 15 percent
Secondary calcium carbonate: 3 to 15 percent, threads, films, and concretions
EC (dS/m): 2 to 8
SAR: 2 to 10
Effervescence: Slight and strong
Reaction: Slightly alkaline or moderately alkaline

Annarose Series

Depth class: Deep to densic bedrock
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.6 to 2.0 in/hr (moderate)
Landscape: Inland, dissected coastal plains
Landform: Interfluves

Parent material: Loamy residuum weathered from calcareous sandstone
Slope: 2 to 5 percent
Elevation: 240 to 630 feet
Mean annual precipitation: 21 to 28 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 261 to 301 days

Taxonomic class

Coarse-loamy, mixed, superactive, hyperthermic Aridic Calciustepts

Typical Pedon

Annarose fine sandy loam in an area of Annarose fine sandy loam, 2 to 5 percent slopes; in shrub cover; Clegg NE, Texas USGS topographic quadrangle; Latitude: 28 degrees, 8 minutes, 39.05 seconds North; Longitude: 98 degrees, 20 minutes, 39.84 seconds West. UTM Easting: 564375 meters, UTM Northing: 3113348 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 6 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist; moderate fine granular structure; hard, friable, nonsticky, nonplastic; strong effervescence; slightly alkaline; clear smooth boundary.

Bk1—6 to 12 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist; weak medium prismatic structure; hard, friable, nonsticky, nonplastic; 2 percent fine carbonate masses; strong effervescence; slightly alkaline; clear wavy boundary.

Bk2—12 to 23 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist; weak medium prismatic structure; hard, friable, nonsticky, nonplastic; 5 percent fine carbonate masses; strong effervescence; slightly alkaline; clear wavy boundary.

Bk3—23 to 37 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; weak medium prismatic structure; hard, friable, nonsticky, nonplastic; 20 percent fine carbonate masses; strong effervescence; slightly alkaline; clear wavy boundary.

Bk4—37 to 47 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; weak medium prismatic structure; hard, firm, nonsticky, nonplastic; 25 percent fine carbonate masses; strong effervescence; slightly alkaline; gradual wavy boundary.

Cdk—47 to 80 inches; very pale brown (10YR 7/3) noncemented sandstone bedrock that has loamy fine sand texture, light gray (10YR 7/2); massive; slight effervescence; moderately alkaline.

Range in Characteristics

Soil Moisture: An aridic ustic moisture regime. The soil moisture control section is moist in some or all parts for less than 90 consecutive days in normal years. June to August and December to February are the driest months, while September to November and March to May are the wettest months.

Depth to densic material: 43 to 80 inches
Particle-size control section (weighted average):
  Clay content: 12 to 18

A horizon

Hue: 10YR
Value: 4 to 6
Chroma: 2 to 3
Texture: Fine sandy loam or loam
Calcium carbonate equivalent: 10 to 25 percent
Effervescence: Slight to strong
Reaction: Slightly alkaline or moderately alkaline

Bw horizon (where present)

Hue: 10YR
Value: 4 to 6
Chroma: 2 to 4
Texture: Fine sandy loam, loam, or sandy clay loam
Calcium carbonate equivalent: 20 to 35 percent
Effervescence: Slight to strong
Reaction: Slightly alkaline or moderately alkaline

Bk horizon

Hue: 10YR
Value: 5 to 7
Chroma: 3 to 4
Texture: Fine sandy loam, loam or sandy clay loam
Calcium carbonate equivalent: 20 to 35 percent
Effervescence: Slight to violent
Reaction: Slightly alkaline or moderately alkaline

BCk horizon (where present)

Hue: 10YR
Value: 7 to 8
Chroma: 2 or 3
Texture: Sandy clay loam, clay loam, or sandy clay
Calcium carbonate equivalent: 20 to 35 percent
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

Cdk layer

Hue: 10YR
Value: 7 to 8
Chroma: 2 to 3
Texture: Loamy fine sand or fine sandy loam
Densic materials: Noncemented sandstone with a fine sandy loam texture
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

Benavides Series

Depth class: Very deep
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.6 to 2.0 in/hr (moderate)
Landscape: Inland, dissected coastal plains
Landform: Interfluves
Parent material: Calcareous loamy residuum of the Goliad Formation
Slope: 2 to 5 percent
Elevation: 300 to 800 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 340 to 360 days

Taxonomic Class

Fine-loamy, mixed, superactive, hyperthermic Aridic Calciustolls

Typical Pedon

Benavides fine sandy loam in an area of Benavides fine sandy loam, 2 to 5 percent slopes; Clegg SW, Texas USGS topographic quadrangle; Longitude: 28 degrees, 5 minutes, 20.02 seconds North; Longitude: 98 degrees, 28 minutes, 57.85 seconds West. UTM Easting: 550817 meters, UTM Northing: 3107158 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 9 inches; dark grayish brown (10YR 4/2) fine sandy loam, brown (10YR 4/3) moist; moderate fine granular structure; friable, soft, nonsticky, nonplastic; common fine roots and medium roots; 10 percent distinct organic stains on all faces of peds; strong effervescence; moderately alkaline; clear smooth boundary.

Bk1—9 to 22 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; firm, slightly hard, nonsticky, nonplastic; common fine roots and medium roots; 5 percent medium irregular carbonate masses in matrix; violent effervescence; moderately alkaline; clear wavy boundary.

Bk2—22 to 33 inches; pale brown (10YR 6/3) sandy clay loam, light yellowish brown (10YR 6/4) moist; moderate medium subangular blocky structure; firm, moderately hard, nonsticky, slightly plastic; few fine roots and medium roots; 10 percent medium irregular carbonate masses in matrix; violent effervescence; moderately alkaline; clear wavy boundary.

Bk3—33 to 45 inches; very pale brown (10YR 7/3) clay loam, pale brown (10YR 6/3) moist; single grain; friable, soft, nonsticky, nonplastic; very few fine roots and medium roots; 15 percent fine threadlike carbonate masses in matrix and 2 percent fine carbonate nodules in matrix; 10 percent gravel sized petrocalcic fragments; violent effervescence; moderately alkaline; clear wavy boundary.

BCk—45 to 80 inches; very pale brown (10YR 7/3) sandy clay loam, pale brown (10YR 6/3) moist; weak fine subangular blocky structure; friable, slightly hard; 10 percent fine irregular weakly cemented carbonate masses in matrix; 10 percent gravel sized petrocalcic fragments violent effervescence; moderately alkaline.

Range in Characteristics

Soil moisture: An aridic ustic moisture regime. The soil moisture control section is moist in some or all parts for less than 90 consecutive days in normal years. June to August and December to February are the driest months, while September to November and March to May are the wettest months.

Depth to secondary calcium carbonate: 5 to 12 inches
Depth to calcic horizon: 12 to 30 inches
Particle-size control section (weighted average):
  Clay content: 20 to 30 percent
  Rock fragments: 0 to 5 percent calcrete gravel

A horizon

Hue: 10YR
Value: 3 to 5
Chroma: 1 to 3
Texture: Fine sandy loam
Clay content: 15 to 20 percent
Calcium carbonate equivalent: 1 to 10 percent
Secondary calcium carbonate: 0 to 8 percent, fine to coarse nodules
Effervescence: Slight to strong
Reaction: Slightly alkaline or moderately alkaline

Bk horizon

Hue: 7.5YR or 10YR
Value: 4 to 7
Chroma: 2 to 4
Texture: Fine sandy loam, loam, sandy clay loam, or clay loam
Clay content: 18 to 30 percent
Rock fragments: 0 to 30 percent gravel sized petrocalcic fragments
Calcium carbonate equivalent: 10 to 40 percent
Secondary calcium carbonate: 0 to 25 percent, fine to coarse masses and nodules
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

BCk horizon

Hue: 7.5YR or 10YR
Value: 6 to 8
Chroma: 2 to 4
Texture: Fine sandy loam, loam, or sandy clay loam
Clay content: 15 to 25 percent
Rock fragments: 0 to 30 percent gravel sized petrocalcic fragments
Calcium carbonate equivalent: 15 to 40 percent
Secondary calcium carbonate: 0 to 10 percent, fine to coarse masses and nodules
Effervescence: Strong or violent
Reaction: Moderately alkaline

Bookout Series

Depth class: Very deep
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.6 to 2.0 in/hr (moderate)
Landscape: Inland, dissected coastal plains
Landform: Erosion remnants, stream terraces
Parent material: Calcareous loamy alluvium
Slope: 0 to 2 percent
Elevation: 400 to 900 feet
Mean annual precipitation: 18 to 26 inches
Mean annual air temperature: 70 to 72 degrees F
Frost-free period: 275 to 300 days

Taxonomic Class

Fine-silty, mixed, superactive, hyperthermic Aridic Calciustepts

Typical Pedon

Bookout clay loam in an area of Bookout clay loam, 0 to 2 percent slopes; Holland Dam, Texas USGS topographic quadrangle; Longitude: 28 degrees, 18 minutes, 46.23 seconds North; Longitude: 99 degrees, 7 minutes, 41.03 seconds West. UTM Easting: 487445 meters, UTM Northing: 3131865 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A1—0 to 6 inches; pale brown (10YR 6/3) clay loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; friable, hard, moderately sticky, moderately plastic; common very fine and common fine roots; few fine tubular pores; strong effervescence; moderately alkaline; abrupt smooth boundary.

A2—6 to 16 inches; pale brown (10YR 6/3) clay loam, brown (10YR 4/3) moist; moderate fine and medium subangular blocky structure; friable, hard, moderately sticky, moderately plastic; many very fine and common fine roots; few fine tubular pores; strong effervescence; moderately alkaline; gradual smooth boundary.

Bk1—16 to 30 inches; light yellowish brown (10YR 6/4) clay, yellowish brown (10YR 5/4) moist; moderate fine and medium subangular blocky structure; friable, hard, moderately sticky, moderately plastic; common very fine roots; few fine tubular pores; 2 percent fine threadlike carbonate masses; violent effervescence; moderately alkaline; gradual wavy boundary.

Bk2—30 to 44 inches; very pale brown (10YR 7/4) clay, light yellowish brown (10YR 6/4) moist; weak fine and medium subangular blocky structure; friable, hard, moderately sticky, moderately plastic; few very fine roots; few fine tubular pores; 5 percent fine threadlike carbonate masses and 5 percent medium irregular carbonate masses; violent effervescence; moderately alkaline; gradual wavy boundary.

Bk3—44 to 80 inches; very pale brown (10YR 7/4) clay, light yellowish brown (10YR 6/4) moist; weak fine and medium subangular blocky structure; friable, hard, moderately sticky, moderately plastic; few very fine roots; few fine tubular pores; 5 percent fine threadlike carbonate masses, 5 percent medium irregular carbonate masses, and 2 percent medium strongly cemented carbonate nodules with clear boundaries; violent effervescence; moderately alkaline.

Range in Characteristics

Soil moisture: An aridic ustic moisture regime. The soil moisture control section is moist in some or all parts for less than 90 consecutive days in normal years. June to August and December to February are the driest months, while September to November and March to May are the wettest months.
Solum thickness: 60 to more than 80 inches
Depth to calcic horizon: 12 to 80 inches
Particle-size control section (weighted average):
  Clay content: 18 to 35 percent
Texture: Clay loam, silty clay loam, or clay
Calcium carbonate equivalent: 20 to 40 percent and one-third to one-half of the carbonates are carbonate clay

A horizon

Hue: 10YR
Value: 5 to 7
Chroma: 2 or 3
Texture: Clay loam or silty clay loam
Clay content: 28 to 40 percent
Effervescence: Slight to strong
Reaction: Slightly alkaline or moderately alkaline

Bk1 and Bk2 horizons

Hue: 7.5YR or 10YR
Value: 6 to 8
Chroma: 3 or 4
Texture: Silty clay loam, silty clay, or clay
Clay content: 28 to 45 percent
Secondary carbonates: 1 percent to 25 percent, fine to coarse, threads, masses, and concretions
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

Lower Bk horizon

Hue: 7.5YR or 10YR
Value: 6 to 8
Chroma: 3 or 4
Texture: Silty clay loam, silty clay, or clay
Clay content: 28 to 45 percent
Secondary calcium carbonate: 1 percent to 25 percent, fine to medium, threads, masses and concretions
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

Brennan Series

Depth class: Very deep
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.6 to 2.0 in/hr (moderate)
Landscape: Inland, dissected coastal plains
Landform: Terraces
Parent material: Loamy alluvium
Slope: 0 to 3 percent
Elevation: 190 to 390 feet
Mean annual precipitation: 17 to 28 inches
Mean annual air temperature: 70 to 75 degrees F
Frost-free period: 260 to 340 days

Taxonomic Class

Fine-loamy, mixed, superactive, hyperthermic Aridic Haplustalfs

Typical Pedon

Brennan fine sandy loam in an area of Brennan fine sandy loam, 0 to 3 percent slopes; Rockaway Creek, Texas USGS topographic quadrangle; Longitude: 28 degrees, 28 minutes, 24.89 seconds North; Longitude: 98 degrees, 41 minutes, 2.96 seconds West. UTM Easting: 530918 meters, UTM Northing: 3149706 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 7 inches; yellowish brown (10YR 5/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; loose, soft, nonsticky, nonplastic; common fine roots; slight effervescence; slightly alkaline; abrupt smooth boundary.

Btk1—7 to 25 inches; brown (10YR 4/3) sandy clay loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; friable, slightly hard, nonsticky, slightly plastic; few fine roots; 35 percent distinct clay films on all faces of peds; 5 percent medium irregular carbonate masses in matrix; slight effervescence; slightly alkaline; clear smooth boundary.

Btk2—25 to 37 inches; brown (10YR 5/3) sandy clay loam, grayish brown (10YR 5/2) moist; weak fine subangular blocky structure; friable, slightly hard, nonsticky, slightly plastic; few fine roots; 25 percent distinct clay films on all faces of peds; 10 percent medium irregular carbonate masses in matrix; slight effervescence; slightly alkaline; gradual smooth boundary.

Bkyz1—37 to 52 inches; pale brown (10YR 6/3) sandy clay loam, grayish brown (10YR 5/2) moist; weak fine subangular blocky structure; friable, slightly hard, slightly sticky, slightly plastic; few fine roots; 1 percent gypsum masses; 5 percent medium irregular carbonate masses; 5 percent medium salt masses; strong effervescence; slightly alkaline; gradual smooth boundary.

Bkyz2—52 to 80 inches; light gray (10YR 7/2) sandy loam, light brownish gray (10YR 6/2) moist; weak fine subangular blocky structure; firm, slightly hard, nonsticky, nonplastic; fine roots; 1 percent threadlike carbonate masses; 5 percent threadlike salt masses; 3 percent irregular gypsum masses; strong effervescence; slightly alkaline.

Range in Characteristics

Soil moisture: An aridic ustic moisture regime. The soil moisture control section is moist in some or all parts for less than 90 consecutive days in normal years. June to August and December to February are the driest months, while September to November and March to May are the wettest months.
Depth to argillic horizon: 8 to 18 inches
Depth to secondary calcium carbonate: 12 to 36 inches
Depth to calcic horizon: 40 to 60 inches
Particle-size control section (weighted average):
  Clay content: 18 to 30 percent
  Rock fragments: 0 to 10 percent
CEC to clay ratio: 0.60 to 0.75

A horizon

Hue: 7.5YR or 10YR
Value: 4 or 5
Chroma: 2 or 4
Other features: The soil has colors and organic carbon that meets requirements for a mollic epipedon, but the surface is both massive and hard when dry.
Texture: Fine sandy loam
Clay content: 8 to 18 percent
Base saturation: 75 to 100 percent
EC (dS/m): 0 to 2
SAR: None
Effervescence: None to slight
Reaction: Neutral or slightly alkaline

Bt horizon (Btk horizon where present)

Hue: 7.5YR or 10YR
Value: 4 to 6
Chroma: 2 to 4
Texture: Loam or sandy clay loam
Clay content: 18 to 30 percent
Clay films: Few or common, faint or distinct, on surfaces of peds and lining pores
Rock fragments: 0 to 10 percent
Calcium carbonate equivalent: 0 to 5 percent
Secondary carbonate: 0 to 2 percent, very fine and fine, films, threads, and masses, on surfaces of peds
Gypsum: 0 to 2 percent
EC (dS/m): 0 to 4
SAR: 0 to 1
Effervescence: Very slight to strong
Reaction: Slightly alkaline or moderately alkaline

Bk horizon (Bkyz where present)

Hue: 7.5YR or 10YR
Value: 5 to 7
Chroma: 2 to 4
Texture: Sandy loam, loam, sandy clay loam, or clay loam

Clay content: 18 to 30 percent
Rock fragments: 0 to 10
Calcium carbonate equivalent: 9 to 40 percent
Secondary carbonate: 2 to 20 percent, fine or medium, on surfaces of peds, occurring in the form of concretions, masses, films, threads, and weakly cemented nodules
Gypsum: 0 to 2 percent
EC (dS/m): 0 to 1
SAR: 0 to 1
Effervescence: Strong and violent
Reaction: Moderately alkaline

Brundage Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability class of the most limiting soil layer: 0.001 to 0.06 in/hr (very slow)
Landscape: Inland, dissected coastal plains
Landform: Flood-plain steps on stream terraces
Parent material: Saline loamy alluvium
Slope: 0 to 2 percent
Elevation: 170 to 460 feet
Mean annual precipitation: 17 to 24 inches
Mean annual air temperature: 72 to 73 degrees F
Frost-free period: 280 to 320 days

Taxonomic Class

Fine-loamy, mixed, active, hyperthermic Aridic Natrustalfs

Typical Pedon

Brundage fine sandy loam (fig. 23) in an area of Brundage fine sandy loam, 0 to 2 percent slopes; Pertle Creek, Texas USGS topographic quadrangle; Longitude: 28 degrees, 33 minutes, 36.70 seconds North; Longitude: 98 degrees, 40 minutes, 58.20 seconds West. UTM Easting: 531027 meters, UTM Northing: 3159280 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 5 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky; slightly hard, very friable, nonsticky, nonplastic; common fine roots; slightly acid; abrupt smooth boundary.
Btn—5 to 13 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; very hard, firm, slightly sticky and slightly plastic; few fine roots; very few fine pores and root channels; few distinct clay films on surfaces of peds; slightly alkaline; clear wavy boundary.
Btknz1—13 to 31 inches; grayish brown (10YR 5/2) sandy clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; hard, firm; moderately sticky, moderately plastic; few fine roots; 20 percent clay films on faces of peds; 5 percent fine threadlike cilium carbonate masses; 1 percent fine salt masses on faces of peds; slightly effervescent; moderately alkaline; gradual wavy boundary.
Btknz2—31 to 47 inches; light brownish gray (10YR 6/2) sandy clay loam, grayish brown (10YR 5/2) moist; moderate medium subangular blocky structure; very hard, very firm; moderately sticky, moderately plastic; few fine roots; 10 percent clay films on faces of peds; 2 percent fine threadlike calcium carbonate masses; 1 percent fine salt masses on faces of peds; 1 percent fine carbonate masses; strongly effervescence; moderately alkaline; gradual wavy boundary.

BCknz—47 to 80 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; weak medium subangular blocky structure; hard, friable; moderately sticky, moderately plastic; few fine roots; 2 percent fine threadlike salt masses; 3 percent fine carbonate masses and 2 percent fine carbonate nodules; strongly effervescence; moderately alkaline.

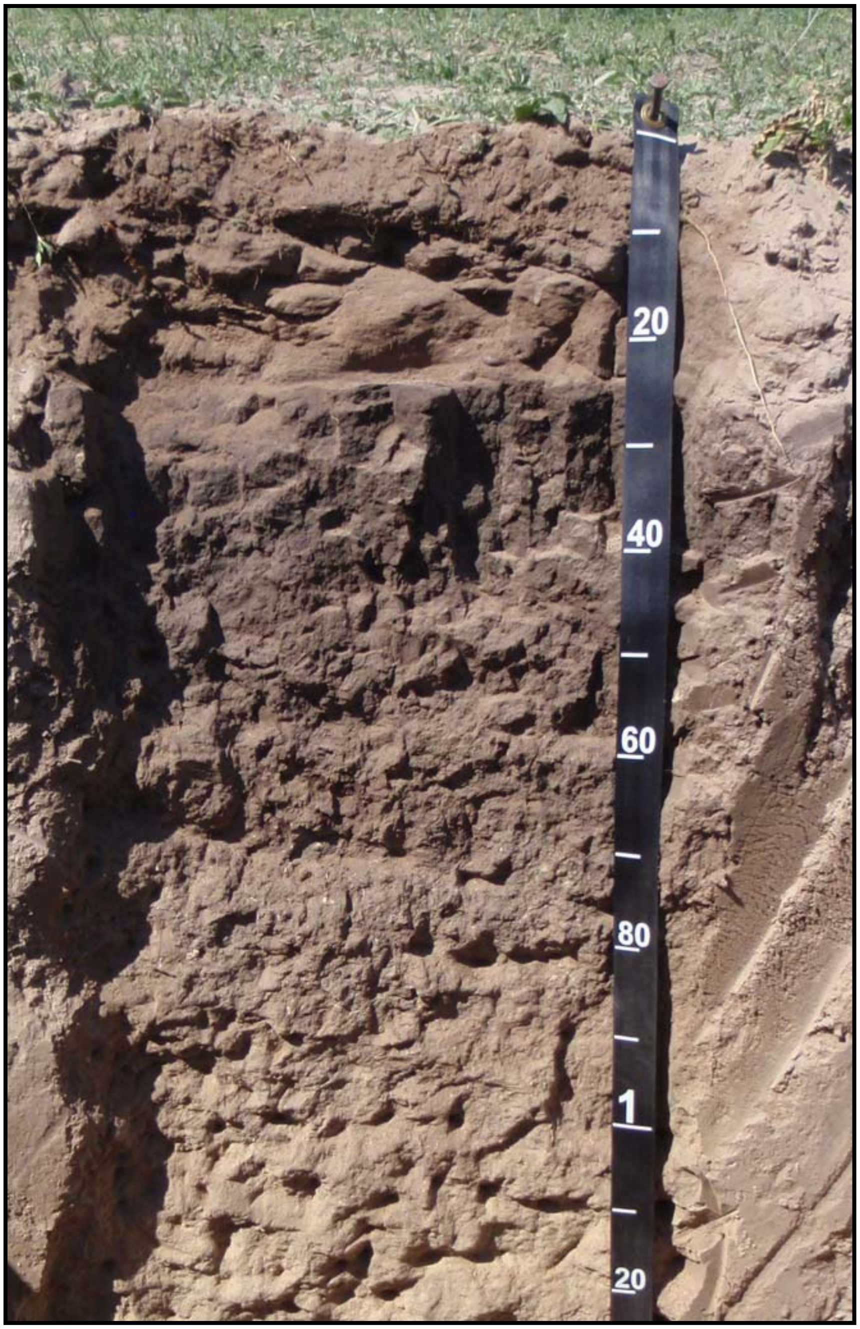

Figure 23.—Profile of Brundage fine sandy loam, 0 to 2 percent slopes. One characteristic of soils high in sodium is the columnar structure, which can be seen at about 25 cm. Brundage soils contain enough sodium in the profile to affect many landuses. Sodium can be toxic to many plants. (Scale in cm-centimeters)

Range in Characteristics

Soil moisture: An aridic ustic moisture regime. The soil moisture control section is moist in some or all parts for less than 90 consecutive days in normal years. June to August and December to February are the driest months, while September to November and March to May are the wettest months.
Solum thickness: 50 to more than 80 inches.
Depth to argillic (natric) horizon: 1 to 12 inches, corresponding to the thickness of the A horizon
Depth to secondary calcium carbonate: 6 to 22 inches
Depth to redox concentrations: 25 to 40 inches
Particle-size control section (weighted average):
  Clay content: 22 to 35 percent
  Rock fragments: 0 to 5 percent
CEC to clay ratio: 0.60 to 0.80

A horizon

Hue: 10YR or 2.5Y
Value: 4 to 7
Chroma: 2 to 4
Texture: Fine sandy loam, very fine sandy loam, or loam; some Ap horizons are sandy clay loam
Clay content: 10 to 20 percent
Base saturation: 75 to 100
Calcium carbonate equivalent: 0 to 1 percent
EC (dS/m): 1 to 4
Gypsum: 0 to 1 percent
SAR: 0 to 12
Effervescence: None or very slight
Reaction: Slightly acid or neutral

Btn and Btknz horizons

Hue: 10YR or 2.5Y
Value: 4 to 7
Chroma: 2 to 4
Texture: Sandy clay loam or clay loam
Clay content: 22 to 35 percent
Clay films: Few to many, faint to prominent, on surfaces of peds or lining pores
Redox concentrations: Upper part—none to few, fine to medium, faint to distinct on surfaces and interiors of peds; lower part—few to common, fine and medium, faint to prominent, on ped surfaces and interiors
Redox depletions: Upper part—none; lower part—none to few, fine to medium, faint to distinct, on surfaces of peds
Rock fragments: 0 to 5 percent
Calcium carbonate equivalent: 0 to 20 percent
Secondary carbonate: 1 to 19 percent, fine to medium, in the form of films and masses
EC (dS/m): 2 to 16 in the upper part and 8 to 16 in the lower part
Gypsum: 0 to 5 percent
SAR: 15 to 40 in the upper part and 5 to 40 in the lower part
Effervescence: Very slight to violent
Reaction: Upper part—slightly acid to slightly alkaline; lower part—slightly alkaline or moderately alkaline

BCknz horizon

Hue: 10YR or 2.5Y
Value: 5 to 8
Chroma: 3 to 6
Texture: Sandy clay loam or clay loam
Clay content: 22 to 30 percent
Redox concentrations: Few to common, fine and medium, faint to prominent
Redox depletions: None to few, fine and medium, faint to distinct
Rock fragments: 0 to 5
Calcium carbonate equivalent: 5 to 50 percent
Secondary carbonate: 1 to 19 percent, fine to medium in the form of films and masses
EC (dS/m): 8 to 16
Gypsum: 0 to 5 percent
SAR: 5 to 50
Effervescence: Very slight to violent
Reaction: Moderately alkaline

C horizon (where present)

In some pedons, below 50 inches, the C horizon is sandy clay loam, clay loam, or these textures are intermingled with soft shale fragments or fractured soft shale or soft siltstone bedrock that slakes to clay loam or clay.

Brystal Series

Depth class: Very deep
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.6 to 2.0 in/hr (moderate)
Landscape: Inland, dissected coastal plains
Landform: Broad interfluves
Parent material: Calcareous loamy residuum weathered from sandstone
Slope: 0 to 3 percent
Elevation: 210 to 350 feet
Mean annual precipitation: 20 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 280 to 320 days

Taxonomic Class

Fine-loamy, mixed, active, hyperthermic Aridic Paleustalfs

Typical Pedon

Brystal fine sandy loam in an area of Brystal fine sandy loam, 0 to 3 percent slopes; Cross NE, Texas USGS topographic quadrangle; Longitude: 28 degrees, 38 minutes, 2.05 seconds North; Longitude: 98 degrees, 35 minutes, 0.59 seconds West. UTM Easting: 540710 meters, UTM Northing: 3167497 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 7 inches; brownish yellow (10YR 6/6) fine sandy loam, dark yellowish brown (10YR 4/6) moist; weak fine subangular blocky structure; very friable, slightly hard, nonsticky, nonplastic; many very fine and many fine roots; many fine interstitial pores; neutral; clear smooth boundary.

Bt—7 to 13 inches; dark brown (7.5YR 4/3) sandy clay loam, very dark brown (7.5YR 2.5/3) moist; moderate medium angular blocky structure; friable, hard, slightly sticky, slightly plastic; many very fine and many fine roots; common very fine interstitial and tubular pores; 20 percent distinct clay films on all faces of peds; neutral; gradual smooth boundary.

Btk1—13 to 27 inches; strong brown (7.5YR 4/6) sandy clay loam, dark brown (7.5YR 3/4) moist; moderate medium angular blocky structure; firm, hard, slightly sticky, slightly plastic; many very fine, many fine, and common coarse root; common very fine interstitial and tubular pores; 18 percent distinct clay films on all faces of peds; 7 percent fine irregular weakly cemented carbonate masses in matrix; slight effervescence; slightly alkaline; gradual smooth boundary.

Btk2—27 to 33 inches; strong brown (7.5YR 5/6) sandy clay loam, strong brown (7.5YR 5/6) moist; weak medium angular blocky structure; firm, hard, slightly sticky, slightly plastic; many very fine and many fine roots; few very fine interstitial and tubular pores; 15 percent distinct clay films on all faces of peds; 12 percent fine irregular weakly cemented carbonate masses in matrix; slight effervescence; slightly alkaline; gradual wavy boundary.

Btk3—33 to 80 inches; reddish yellow (7.5YR 6/6) sandy clay loam, strong brown (7.5YR 5/6) moist; moderate medium subangular blocky structure; firm, hard, slightly sticky, slightly plastic; many very fine roots; few very fine interstitial and tubular pores; 10 percent distinct clay films on all faces of peds; 10 percent fine irregular weakly cemented carbonate masses in matrix; strong effervescence; slightly alkaline.

Range in Characteristics

Soil moisture: An aridic ustic moisture regime. The soil moisture control section is moist in some or all parts for less than 90 consecutive days in normal years. June to August and December to February are the driest months, while September to November and March to May are the wettest months.

Solum thickness: 60 to more than 80 inches.
Depth to argillic horizon: 6 to 15 inches
Depth to secondary calcium carbonate: 20 to 35 inches
Particle-size control section (weighted average):
  Clay content: 18 to 32 percent

A horizon

Hue: 5YR to 10YR
Value: 4 or 5
Chroma: 2 to 4
Texture: Loamy fine sand, fine sandy loam, or very fine sandy loam
Rock fragments: 0 to 15 percent gravels
EC (dS/m): 0 to 1
SAR: 0 to 2
Reaction: Neutral or slightly alkaline

Bt horizon

Hue: 2.5YR to 7.5YR
Value: 4 to 7
Chroma: 2 to 6
Texture: Fine sandy loam, very fine sandy loam, sandy loam, loam, or sandy clay loam
Clay content: 18 to 32 percent
EC (dS/m): 0 to 2
SAR: 0 to 8
Reaction: Neutral to moderately alkaline

Btk horizon

Hue: 2.5YR to 10YR
Value: 4 to 7

Chroma: 4 to 8
Texture: Sandy clay loam, loam, fine sandy loam, very fine sandy loam, or sandy loam
Clay content: 15 to 32 percent
Other features: Few to common small pockets and streaks of uncoated sand grains occur in some pedons
Secondary calcium carbonate: 1 to 25 percent masses and concretions
EC (dS/m): 0 to 6
SAR: 0 to 12
Effervesence: None to strong
Reaction: Slightly alkaline or moderately alkaline

Buchel Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability class of the most limiting soil layer: 0.001 to 0.06 in/hr (very slow)
Landscape: River valleys, inland, dissected coastal plains
Landform: Flood plains
Parent material: Calcareous clayey alluvium
Slope: 0 to 1 percent
Elevation: 40 to 450 feet
Mean annual precipitation: 25 to 32 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 261 to 301 days

Taxonomic Class

Fine, smectitic, hyperthermic Typic Haplusterts

Typical Pedon

Buchel clay in an area of Buchel clay, 0 to 1 percent slopes, frequently flooded; Calliham, Texas USGS topographic quadrangle; Longitude: 28 degrees, 22 minutes, 43.17 seconds North; Longitude: 98 degrees, 21 minutes, 51.94 seconds West. UTM Easting: 562272 meters, UTM Northing: 3139314 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 8 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure; firm, moderately hard, very sticky, very plastic; many very fine and common fine roots; common fine interstitial pores; slight effervescence; slightly alkaline; clear smooth boundary.

Bss1—8 to 22 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; moderate medium subangular blocky structure; very firm, hard, very sticky, very plastic; common very fine roots; common very fine tubular pores; 10 percent distinct pressure faces; slight effervescence; slightly alkaline; gradual wavy boundary.

Bss2—22 to 37 inches; 60 percent grayish brown (10YR 5/2) and 40 percent dark gray (10YR 4/1) clay, 60 percent dark grayish brown (10YR 4/2) and 40 percent very dark gray (10YR 3/1) moist; moderate medium wedge structure, and moderate medium angular blocky structure; very firm, hard, very sticky, very plastic; common very fine roots; common very fine tubular pores; 10 percent faint slickensides (pedogenic); slight effervescence; slightly alkaline; gradual wavy boundary.

Bss3—37 to 53 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; moderate medium wedge structure, and moderate medium angular blocky structure; very firm, very hard, very sticky, very plastic; common very fine roots; common very fine tubular pores; 25 percent faint slickensides (pedogenic); 2 percent fine faint dark yellowish brown (10YR 4/4) iron-manganese masses with sharp boundaries between peds; slight effervescence; slightly alkaline; gradual wavy boundary.

Bkss—53 to 80 inches; light brownish gray (10YR 6/2) clay, grayish brown (10YR 5/2) moist; weak coarse wedge structure, and weak coarse angular blocky structure; very firm, very hard, very sticky, very plastic; 30 percent faint slickensides (pedogenic); 2 percent fine threadlike carbonate masses; 1 percent fine threadlike calcium carbonate masses; slight effervescence; slightly alkaline.

Range in Characteristics

Soil moisture: A typic ustic moisture regime. The soil moisture control section is dry in some or all parts for more than 90 days but less than 180 cumulative days in normal years. June through August and December through February are the driest months. These soils are intermittently moist in September through November and March through May.

Solum thickness: More than 80 inches
Depth to vertic features: 8 to 24 inches
Particle-size control section (weighted average):
  Clay content: 40 to 60 percent

A horizon

Hue: 10YR
Value: 2 to 4
Chroma: 1 to 2
Texture: Clay or silty clay
Effervescence: None to strongly
Reaction: Slightly alkaline or moderately alkaline

Bss horizon

Hue: 10YR
Value: 2 to 5
Chroma: 1 to 2
Texture: Clay or silty clay
Redox concentrations: 2 to 20 percent, iron-manganese masses
Effervescence: None to strongly
Reaction: Slightly alkaline or moderately alkaline

Bkss horizon

Hue: 10YR
Value: 3 to 6
Chroma: 1 to 3
Texture: Clay or silty clay
Redox concentrations: None to common, fine, brown
Redox depletions: None to common, fine, gray
Secondary carbonates: Few to common, fine, threads and masses in the matrix
Effervescence: Very slight to strongly
Reaction: Slightly alkaline or moderately alkaline

B'ss horizon (where present)

Hue: 10YR
Value: 4 to 7
Chroma: 1 to 4
Texture: Clay or silty clay
Redox concentrations: None to common, brown

Effervescence: Very slight to strongly
Reaction: Slightly alkaline or moderately alkaline

Caid Series

Depth class: Very deep
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.6 to 2.0 in/hr (moderate)
Landscape: Inland, dissected coastal plains
Landform: Terraces
Parent material: Loamy alluvium
Slope: 0 to 3 percent
Elevation: 300 to 900 feet
Mean annual precipitation: 21 to 26 inches
Mean annual air temperature: 70 to 72 degrees F
Frost-free period: 255 to 290 days

Taxonomic Class

Fine-loamy, mixed, active, hyperthermic Aridic Paleustolls

Typical Pedon

Caid sandy clay loam (fig. 24) in an area of Caid sandy clay loam, 0 to 3 percent slopes; Rockaway Creek, Texas USGS topographic quadrangle; Longitude: 28 degrees, 29 minutes, 24.29 seconds North; Longitude: 98 degrees, 44 minutes, 38.08 seconds West. UTM Easting: 525065 meters, UTM Northing: 3151520 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 10 inches; brown (10YR 4/3) sandy clay loam, dark brown (10YR 3/3) moist; weak medium granular structure; slightly hard very friable; many very fine roots; strong effervescence; neutral; clear smooth boundary.

Btk1—10 to 15 inches; brown (7.5YR 4/2) sandy clay loam, dark brown (7.5YR 3/2) moist; weak medium subangular blocky structure; friable; hard, friable; common very fine roots; common very fine tubular pores; 5 percent faint clay films on all faces of peds; 10 percent fine threadlike carbonate masses in matrix; violent effervescence; slightly alkaline; clear smooth boundary.

Btk2—15 to 28 inches; brown (7.5YR 5/3) sandy clay loam, brown (7.5YR 4/3) moist; moderate medium subangular blocky structure; friable; very hard, firm; common very fine roots; common very fine tubular pores; 10 percent distinct clay films on all faces of peds; 12 percent fine threadlike carbonate masses in matrix; violent effervescence; slightly alkaline; clear smooth boundary.

Btk3—28 to 39 inches; light brown (7.5YR 6/4) clay loam, brown (7.5YR 5/4) moist; moderate medium angular blocky structure; firm; hard, firm; 10 percent distinct clay films on all faces of peds; 15 percent fine carbonate masses in matrix, and 1 percent fine carbonate nodules; violent effervescence; slightly alkaline; gradual smooth boundary.

Btk4—39 to 61 inches; light brown (7.5YR 6/4) clay loam, light brown (7.5YR 6/4) moist; weak coarse subangular blocky structure; firm; very hard, firm; 10 percent distinct clay films on all faces of peds; 2 percent fine carbonate nodules and 15 percent medium carbonate masses; violent effervescence; moderately alkaline; gradual smooth boundary.

Btk5—61 to 80 inches; pink (7.5YR 7/4) clay loam, light brown (7.5YR 6/4) moist; weak coarse subangular blocky structure; firm; very hard, very firm; 10 percent distinct clay films on all faces of peds; 10 percent coarse carbonate masses; violent effervescence; slightly alkaline.

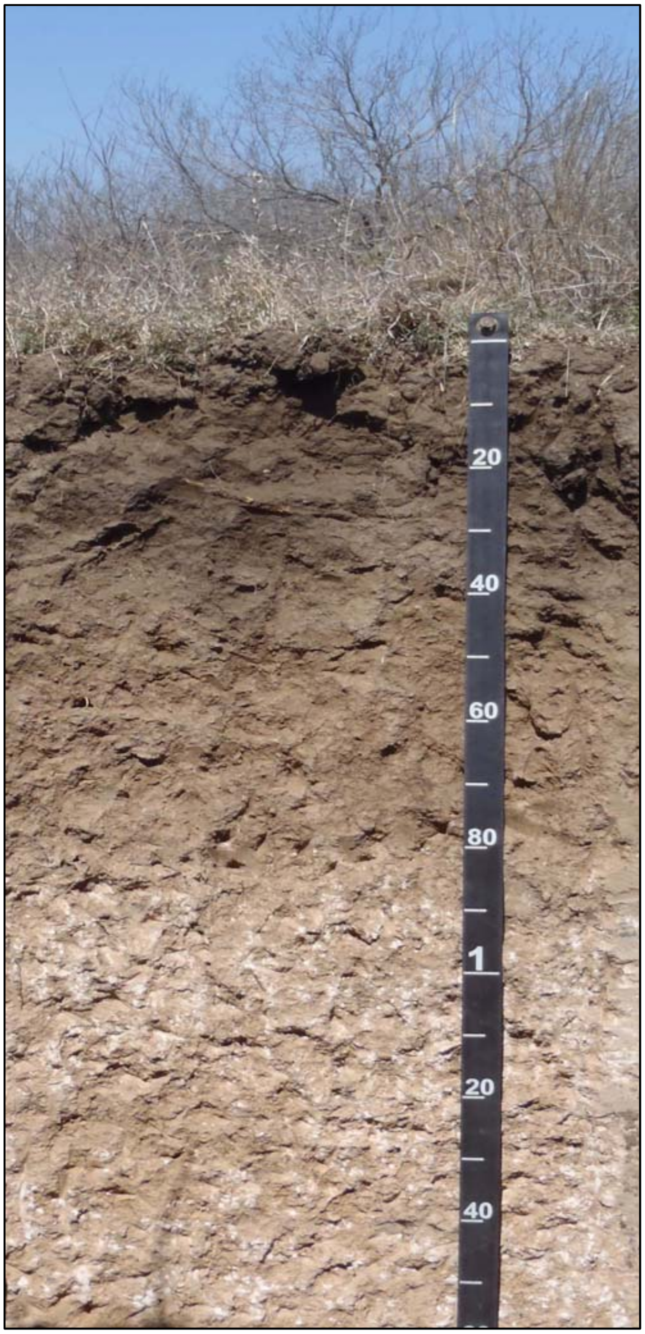

Figure 24.—Profile of Caid sandy clay loam, 0 to 3 percent slopes. Caid soils have high production yields and are well suited to pastures in normal precipitation years. (Scale in cm-centimeters)

Range in Characteristics

Soil moisture: An aridic ustic moisture regime. The soil moisture control section is moist in some or all parts for less than 90 consecutive days in normal years. June to August and December to February are the driest months, while September to November and March to May are the wettest months.

Solum thickness: 60 to 80 inches
Depth to argillic horizon: 5 to 69 inches
Depth to calcic horizon: 25 to 40 inches; secondary forms of calcium carbonate occur in all horizons.

A horizon

Hue: 7.5YR or 10YR
Value: 3 to 5
Chroma: 2 or 3
Texture: Very fine sandy loam, loam, or sandy clay loam
Clay content: 16 to 30 percent
Effervescence: Slight to strong
Reaction: Neutral to moderately alkaline

Btk horizon (upper part)

Hue: 7.5YR or 10YR
Value: 4 to 6
Chroma: 2 to 6
Texture: Sandy clay loam or clay loam
Clay content: 27 to 35 percent
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

Btk horizon (lower part)

Hue: 5YR to 10YR
Value: 6 or 7
Chroma: 3 to 6
Texture: Sandy clay loam or clay loam
Clay content: 23 to 35 percent
Redox concentrations: 0 to 25 percent; in shades of brown or yellow
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

Cr layer (where present)

Some pedons have a Cr layer that contains yellow sandstone bedrock interbedded with shale bedrock below 60 inches

Campbellton Series

Depth class: Very deep to densic material
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.2 to 0.6 in/hr (moderately slow)
Landscape: Inland, dissected coastal plains
Landform: Interfluves, ridges
Parent material: Loamy residuum weathered from shale
Slope: 1 to 3 percent
Elevation: 200 to 440 feet
Mean annual precipitation: 23 to 30 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 260 to 290 days

Taxonomic Class

Fine, smectitic, hyperthermic Typic Argiustolls

Typical Pedon

Campbellton clay loam in an area of Campbellton clay loam, 1 to 3 percent slopes; Tilden, Texas USGS topographic quadrangle; Longitude: 28 degrees, 23 minutes, 42.32 seconds North; Longitude: 98 degrees, 37 minutes, 17.36 seconds West. UTM Easting: 537080 meters, UTM Northing: 3141028 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 5 inches; very dark gray (10YR 3/1) clay loam, black (10YR 2/1) moist; weak fine subangular blocky structure; friable, slightly hard, moderately sticky, slightly plastic; slight effervescence; moderately alkaline; gradual wavy boundary.

Bt1—5 to 19 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; moderate medium subangular blocky structure; slightly rigid, moderately hard, very sticky, moderately plastic; 20 percent distinct clay films on all faces of peds; strong effervescence; moderately alkaline; slightly saline; gradual wavy boundary.

Bt2—19 to 28 inches; brown (10YR 5/3) clay, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly rigid, moderately hard, very sticky, moderately plastic; 15 percent distinct clay films on all faces of peds; strong effervescence; slightly alkaline; slightly saline; gradual wavy boundary.

Btkz—28 to 63 inches; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; friable, slightly hard, moderately sticky, slightly plastic; 10 percent distinct clay films on all faces of peds; 10 percent carbonate masses in matrix; 20 percent salt masses in matrix; violent effervescence; slightly alkaline; moderately saline; gradual wavy boundary.

Cdyz—63 to 80 inches; olive (5Y 5/3) clay, olive (5Y 4/3) moist; massive; noncemented mudstone, very sticky, moderately plastic; 1 percent gypsum crystals in matrix; 3 percent fine salt masses in matrix; slight effervescence; slightly alkaline.

Range in Characteristics

Soil moisture: A typic ustic moisture regime. The soil moisture control section is dry in some or all parts for more than 90 days but less than 180 cumulative days in normal years. June through August and December through February are the driest months. These soils are intermittently moist in September through November and March through May.

Solum thickness: 40 to 60 inches
Depth to argillic horizon: 3 to 45 inches
Depth to secondary carbonates: 10 to 80 inches
Particle-size control section (weighted average): None
Calcium carbonate equivalent: 10 to 25 percent

A horizon

Hue: 10YR
Value: 3 to 5
Chroma: 1 to 3
Texture: Loam, sandy clay loam, or clay loam
Clay content: 25 to 40
EC (dS/m): 0 to 2
Effervescence: Very slight to strong
Reaction: Slightly alkaline or moderately alkaline

Bt or Btk horizons

Hue: 10YR or 2.5Y
Value: 3 to 5

Chroma: 1 to 4
Texture: Clay loam or clay
Clay content: 35 to 48
Secondary carbonates: 1 to 5 percent, fine, threadlike and masses
EC (dS/m): 2 to 8
SAR: 2 to 15
Effervescence: Very slight to strong
Reaction: Slightly alkaline or moderately alkaline

Btkz horizon

Hue: 10YR or 2.5Y
Value: 5 to 7
Chroma: 2 to 4
Texture: Clay loam or clay
Clay content: 35 to 55
Secondary carbonates: 1 to 10 percent, fine and medium, threadlike and masses
EC (dS/m): 2 to 8
SAR: 8 to 40
Effervescence: Slight to violent
Reaction: Slightly alkaline or moderately alkaline

BC horizon (where present)

Hue: 7.5YR, 10YR, or 2.5Y
Value: 6 to 8
Chroma: 2 to 6
Texture: Clay loam or clay
Clay content: 32 to 50
SAR: 15 to 45
Effervescence: Slight to violent
Reaction: Slightly alkaline or moderately alkaline

Ckyz layer (where present)

Hue: 10YR to 5Y
Value: 6 to 8
Chroma: 2 to 4
Texture: Clay loam or clay interbedded with claystone and sandstone
Gypsum: 0 to 5 percent
Effervescence: Slight to violent
Reaction: Slightly alkaline or moderately alkaline

Cdyz layer

Hue: 2.5Y or 5Y
Value: 5 to 8
Chroma: 1 to 5
Texture: Clay loam, clay, or silty clay
Gypsum: 0 to 5 percent
Effervescence: Slight to violent
Reaction: Slightly alkaline or moderately alkaline

Catarina Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability class of the most limiting soil layer: 0.001 to 0.06 in/hr (very slow)

Landscape: Inland, dissected coastal plains
Landform: Valley floors, valley sides
Parent material: Calcareous, saline clayey alluvium
Slope: 0 to 2 percent
Elevation: 300 to 800 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Taxonomic Class

Fine, smectitic, hyperthermic Sodic Haplusterts

Typical Pedon

Catarina clay in an area of Catarina clay, 0 to 2 percent slopes; Biel Lake SE, Texas USGS topographic quadrangle; Longitude: 27 degrees, 49 minutes, 19.90 seconds North; Longitude: 98 degrees, 46 minutes, 47.70 seconds West. UTM Easting: 521675 meters, UTM Northing: 3077526 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 3 inches; grayish brown (2.5Y 5/2) clay, (2.5Y 4/2) moist; strong medium subangular blocky structure and strong fine subangular blocky structure; extremely hard, firm; very sticky and very plastic; strong effervescence; moderately alkaline; gradual wavy boundary.

Bknssyz1—3 to 19 inches; pale olive (5Y 6/3) clay, (5Y 5/3) moist; strong very coarse wedge structure, and strong medium and coarse subangular blocky structure; extremely hard, firm, very sticky and very plastic; distinct slickensides (pedogenic); few fine threadlike carbonate masses; strong effervescence; moderately alkaline; gradual wavy boundary.

Bknssyz2—19 to 45 inches; pale olive (5Y 6/3) silty clay, (5Y 5/3); strong very coarse wedge structure, and strong medium and coarse subangular blocky structure; extremely hard, firm, very sticky and very plastic; distinct slickensides (pedogenic); few fine threadlike carbonate masses; strong effervescence; slightly alkaline; gradual wavy boundary.

Bknssyz3—45 to 56 inches; olive (5Y 5/3) clay, (5Y 5/2) moist; strong very coarse wedge structure, and strong medium and coarse subangular blocky structure; extremely hard, firm; very sticky and very plastic; slickensides (pedogenic); common fine threadlike carbonate masses, few fine gypsum, and other salts; slight effervescence; moderately alkaline; gradual wavy boundary.

Bknssyz4—56 to 73 inches; olive (5Y 5/3) clay, (5Y 4/3) moist; strong very coarse wedge structure, and strong medium and coarse subangular blocky structure; extremely hard, firm, very sticky; distinct slickensides (pedogenic); 1 percent fine prominent strong brown (7.5YR 5/8) iron-manganese masses, and 3 percent fine prominent olive yellow (2.5Y 6/8) iron-manganese masses; common fine threadlike carbonate masses, few fine gypsum, and other salts; slight effervescence; moderately alkaline; gradual wavy boundary.

Cknyz—73 to 80 inches; light olive gray (5Y 6/2) clay, (5Y 5/2) moist; massive; extremely hard, very firm, very sticky and very plastic; 1 percent fine prominent strong brown (7.5YR 5/8) iron-manganese masses; common fine threadlike carbonate masses, few fine gypsum, and other salts; moderately alkaline.

Range in Characteristics

Soil moisture: An aridic ustic moisture regime. The soil moisture control section is moist in some or all parts for less than 90 consecutive days in normal years. June to August and December to February are the driest months, while September to November and March to May are the wettest months.

Solum thickness: 40 to more than 80 inches
Depth to secondary calcium carbonates: 7 to 25 inches
Depth to slickensides: 3 to 15 inches; COLE ranges from about 0.09 to 0.16. The soil cracks 1/4 inch to 2 inches wide at the surface when dry and the cracks extend to a depth of 20 inches or more.
Depth to salt accumulations: 3 to 15 inches; salinity increases with depth in the upper 40 inches. The exchangeable sodium percentage is 15 or more (13 percent or more SAR) in the upper 30 inches of the solum.
Depth to redox concentrations: 20 to 40 inches
Depth to redox depletions: where present, 20 to 40 inches
Particle-size control section (weighted average):
  Clay content: 40 to 60 percent
  Rock fragments: 0 to 10 percent
CEC to clay ratio: Greater than 0.60

A horizon

Hue: 10YR to 5Y
Value: 5 or 6
Chroma: 2 to 4
Texture: Clay or silty clay
Clay content: 35 to 60 percent
Calcium carbonate equivalent: 2 to 15 percent
EC (dS/m): 0 to 8
Gypsum: 0 to 5 percent
SAR: 0 to 30
Effervescence: None to strong
Reaction: Slightly alkaline or moderately alkaline

Bknssyz horizon

Hue: 10YR to 5Y
Value: 5 to 7
Chroma: 2 to 4
Texture: Clay or silty clay
Clay content: 40 to 60 percent
Redox concentrations: None to common, fine or medium, faint to prominent, on surfaces and interiors of peds
Redox depletions: None to few, fine, faint on surfaces of peds
Rock fragments: 0 to 10 percent
Calcium carbonate equivalent: 2 to 20 percent
Secondary carbonates: 2 to 20 percent, fine and medium, in the form of films, threads, concretions, and masses mainly concentrated along ped faces and along cracks
EC (dS/m): 4 to 24
Gypsum: 0 to 15 percent
SAR: 13 to 35
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

Cknyz horizon (where present)

Hue: 2.5Y or 5Y
Value: 5 to 8
Chroma: 2 to 4
Texture: Clay or silty clay
Clay content: 40 to 60 percent

Redox concentrations: None to common, fine or medium, faint to prominent, on surfaces and interiors of peds
Redox depletions: None to few, fine, faint on surfaces of peds
Rock fragments: 0 to 10 percent
Calcium carbonate equivalent: 2 to 20 percent
Secondary carbonates: 2 to 20 percent, fine and medium, in the form of films, threads, concretions, and masses mainly concentrated along ped faces and along cracks
EC (dS/m): 4 to 24
Gypsum: 0 to 15 percent
SAR: 13 to 35
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline
Note: In some pedons, a Cd horizon of clay or clay intermingled with soft shale fragments, occurs below 40 inches. Crystalline segregation of salt are few to many.

Chacon Series

Depth class: Very deep
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.001 to 0.06 in/hr (very slow)
Landscape: Inland, dissected coastal plains
Landform: Terraces
Parent material: Calcareous clayey alluvium over calcareous clayey residuum weathered from shale
Slope: 0 to 2 percent
Elevation: 180 to 470 feet
Mean annual precipitation: 20 to 28 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 260 to 320 days

Taxonomic Class

Fine, smectitic, hyperthermic Torrertic Argiustolls

Typical Pedon

Chacon sandy clay loam (fig. 25) in an area of Chacon sandy clay loam, 0 to 2 percent slopes; Fitzpatrick Hollow, Texas USGS topographic quadrangle; Longitude: 28 degrees, 16 minutes, 9.07 seconds North; Longitude: 98 degrees, 33 minutes, 17.60 seconds West. UTM Easting: 543656 meters, UTM Northing: 3127102 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

Ap—0 to 11 inches; dark brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium subangular blocky structure; friable, hard, slightly sticky, slightly plastic; many fine tubular pores; strong effervescence; slightly alkaline; clear smooth boundary.
Bt—11 to 19 inches; brown (10YR 4/3) clay, dark brown (10YR 3/3) moist; moderate fine and medium angular blocky structure; firm, very hard, moderately sticky, moderately plastic; many fine interstitial pores; 65 percent prominent clay films on all faces of peds; strong effervescence; slightly alkaline; abrupt smooth boundary.
Btk—19 to 28 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) moist; moderate fine and medium angular blocky structure; firm, very hard, moderately sticky, moderately plastic; common fine interstitial pores; 35 percent distinct clay films on all faces of peds; 3 percent fine spherical carbonate masses in matrix; slight effervescence; moderately alkaline gradual wavy boundary.

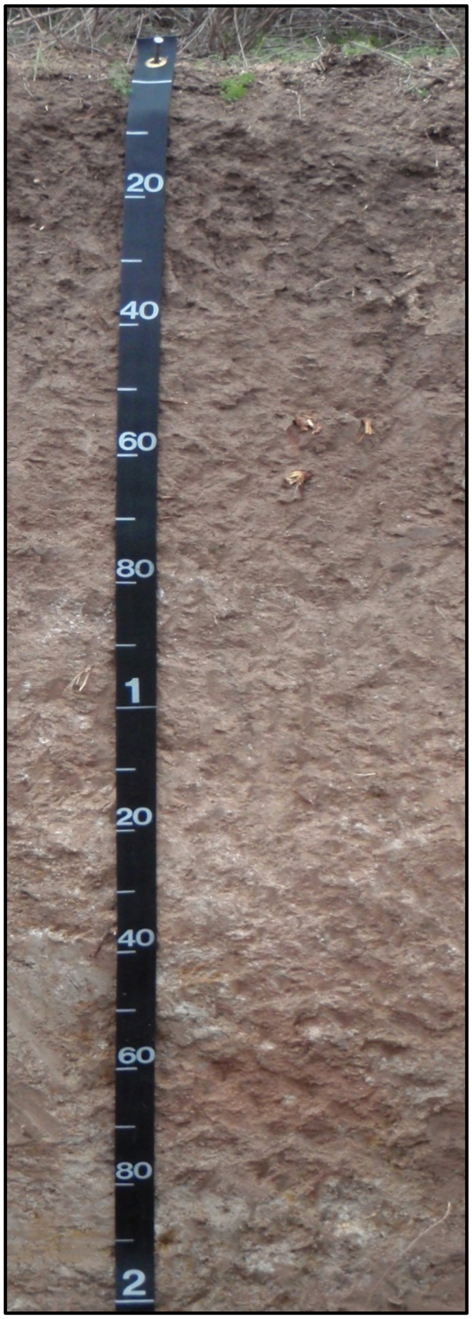

Figure 25.—Profile of Chacon sandy clay loam, 0 to 2 percent slopes. The clayey argillic horizon, also known as a Bt horizon, begins at a depth of 11 inches (27 cm). Chacon soils have loamy surfaces over a clayey subsoil. (Scale in cm-centimeters)

Btk—28 to 44 inches; light yellowish brown (10YR 6/4) clay loam, pale brown (10YR 6/3) moist; moderate medium and coarse subangular blocky structure; very firm, extremely hard, moderately sticky, very plastic; 5 percent faint clay films on all faces of peds; 3 percent medium irregular carbonate masses in matrix and 5 percent coarse spherical carbonate nodules in matrix; strong effervescence; moderately alkaline; gradual wavy boundary.

BCkyz—44 to 80 inches; very pale brown (10YR 7/4) sandy clay loam, very pale brown (10YR 7/3) moist; weak medium subangular blocky structure; very firm, hard, moderately sticky, moderately plastic; 12 percent fine irregular carbonate masses in matrix and 3 percent medium spherical carbonate masses in matrix; 1 percent gypsum crystals; 3 percent fine masses of salts; strong effervescence; slightly saline; moderately alkaline.

Range in Characteristics

Soil moisture: An aridic ustic moisture regime. The soil moisture control section is moist in some or all parts for less than 90 consecutive days in normal years. June to August and December to February are the driest months, while September to November and March to May are the wettest months.
Solum thickness: 40 to 80 inches over calcareous clays stratified with weakly consolidated sandstone and shale.
Thickness of mollic epipedon: 10 to 30 inches
Depth to argillic horizon: 6 to 17 inches
Depth to secondary carbonates: 17 to 40 inches
Particle-size control section (weighted average):
  Clay content: 35 to 50 percent
  Rock fragments: 0 to 5 percent
Vertic properties: COLE is 0.07 to 0.15 in the upper 50 inches. The soil cracks 1/4 inch to 1.0 inch wide at the surface when dry, and the cracks extend to a depth of 20 inches or more.

A horizon

Hue: 10YR
Value: 3 to 5
Chroma: 1 or 2
Texture: Loam, sandy clay loam, clay loam, or clay
Clay content: 22 to 42
Calcium carbonate equivalent: 5 to 15 percent
EC (dS/m): 0 to 4
Gypsum: 0 to 1 percent
SAR: 0 to 2
Effervescence: Slight to strong
Reaction: Slightly alkaline or moderately alkaline

Bt or Btk horizons

Hue: 10YR or 2.5Y
Value: 4 to 6
Chroma: 1 to 4
Texture: Sandy clay, clay loam, or clay
Clay content: 35 to 50
Calcium carbonate equivalent: 5 to 20 percent
Secondary carbonate: 2 to 20 percent, fine and medium, films, threads, masses
EC (dS/m): 0 to 4
Gypsum: 0 to 1 percent
SAR: 0 to 2
Effervescence: Slight or strong
Reaction: Slightly alkaline or moderately alkaline

BCkyz horizon

Hue: 10YR or 2.5Y
Value: 5 to 7
Chroma: 2 or 4

Texture: Sandy clay loam, clay loam, or clay
Clay content: 35 to 50
Calcium carbonate equivalent: 9 to 20 percent
Secondary carbonate: 2 to 20 percent, fine and medium, films, threads, masses
Salt concentrations: 2 to 20 percent, fine and medium, films, threads, masses
EC (dS/m): 4 to 8
Gypsum: 1 to 3 percent
SAR: 2 to 13
Effervescence: Slight to strong
Reaction: Moderately alkaline

Cd horizon (where present)

Soft interbedded mudstone, shale, and sandstone

Choke Series

Depth class: Very deep
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.6 to 2.0 in/hr (moderate)
Landscape: Inland, dissected coastal plains
Landform: Knobs on ridges, knobs on interfluves
Parent material: Clayey alluvium over weakly cemented siltstone
Slope: 1 to 3 percent
Elevation: 200 to 400 feet
Mean annual precipitation: 22 to 28 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 285 to 300 days

Taxonomic Class

Fine-silty, mixed, superactive, hyperthermic Aridic Calciustolls

Typical Pedon

Choke silty clay loam in an area of Choke silty clay loam, 1 to 3 percent slopes; Comanche Hills, Texas USGS topographic quadrangle; Longitude: 28 degrees, 36 minutes, 24.00 seconds North; Longitude: 98 degrees, 11 minutes, 24.00 seconds West. UTM Easting: 579192 meters, UTM Northing: 3164677 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A1—0 to 4 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; friable, slightly hard, slightly sticky, slightly plastic; common very fine and fine, few medium and coarse roots; common very fine and fine low continuity tubular pores; 3 percent insect casts; slight effervescence; moderately alkaline; clear smooth boundary.

A2—4 to 10 inches; very dark grayish brown (10YR 3/2) silty clay loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; friable, slightly hard, slightly sticky, slightly plastic; common very fine and fine, few medium and coarse roots; common very fine and fine low continuity tubular pores; 3 percent insect casts; slight effervescence; moderately alkaline; clear smooth boundary.

Bw1—10 to 16 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to moderate fine subangular blocky structure; friable, slightly hard, slightly sticky, nonplastic; common very fine and fine, few medium and coarse roots; common very fine and fine low continuity tubular pores; 2 percent insect casts; 2 percent fungi filaments; strong effervescence; moderately alkaline; clear smooth boundary.

Bw2—16 to 24 inches; grayish brown (10YR 5/2) silty clay loam, dark grayish brown (10YR 4/2) moist; medium prismatic structure parting to moderate fine subangular blocky structure; friable, hard, slightly sticky, slightly plastic; common very fine and fine, and few medium roots; common very fine and fine, and common medium low continuity tubular pores; 2 percent fine carbonate threads; 2 percent insect casts; 3 percent fungi filaments; violent effervescence; moderately alkaline; gradual smooth boundary.

Bk1—24 to 34 inches; light brownish gray (10YR 6/2) silty clay loam, grayish brown (10YR 5/2) moist; weak fine and medium prismatic structure parting to moderate fine and medium subangular blocky structure; friable, hard, slightly sticky, slightly plastic; common very fine and fine, few medium and coarse roots; many very fine and fine, and common medium low continuity tubular pores; and 5 percent fine carbonate threads; 2 percent insect casts; 1 percent fungi filaments; violent effervescence; moderately alkaline; gradual smooth boundary.

Bk2—34 to 48 inches; light gray (10YR 7/2) silt loam, very pale brown (10YR 7/3) moist; weak fine and medium prismatic structure parting to moderate fine and medium subangular blocky structure; friable, hard, slightly sticky, slightly plastic; common very fine and fine, few medium and coarse roots; many very fine and fine, and medium low continuity tubular pores; 5 percent fine carbonate threads; 1 percent insect casts; violent effervescence; moderately alkaline; gradual smooth boundary.

Bk3—48 to 58 inches; light gray (10YR 7/2) loam, very pale brown (10YR 7/3) moist; weak fine and medium subangular blocky structure; very friable, slightly hard, nonsticky, slightly plastic; few very fine and fine roots; many very fine and fine low continuity tubular pores; 3 percent fine carbonate threads; 1 percent insect casts; violent effervescence; moderately alkaline; clear smooth boundary.

BCk—58 to 73 inches; light gray (10YR 7/2) loam, very pale brown (10YR 7/3) moist; weak fine and medium subangular blocky structure; very firm, soft, nonsticky, nonplastic; few very fine and fine roots; many very fine and fine low continuity tubular pores; 1 percent fine carbonate threads and 2 percent fine carbonate concretions; contains 1 percent by volume rounded siliceous pebbles (deposited by water); strong effervescence; moderately alkaline; abrupt wavy boundary.

2Cd—73 to 80 inches; very pale brown (10YR 7/3) noncemented siltstone that has silt loam texture, pale brown (10YR 6/3) moist; massive; extremely firm, extremely hard, nonsticky, nonplastic; few very fine and fine, and few medium and coarse roots in cracks; common very fine and fine low continuity tubular pores; common coatings of calcium carbonates along vertical and horizontal fracture seams; strong effervescence; moderately alkaline.

Range in Characteristics

Soil moisture: An aridic ustic moisture regime. The soil moisture control section is moist in some or all parts for less than 90 consecutive days in normal years. June to August and December to February are the driest months, while September to November and March to May are the wettest months.

Solum thickness: 60 to 80 inches
Depth to densic contact: 60 to 80 inches
Particle-size control section (weighted average):
Clay content: 20 to 35 percent, non-carbonate
Sand content (coarser than very fine sand): 4 to 15 percent

A horizon

Hue: 10YR
Value: 3 to 5
Chroma: 2 or 3
Texture: Silt loam or silty clay loam

Calcium carbonate equivalent: 5 to 15 percent
Effervescence: Slight to violent
Reaction: Slightly alkaline to moderately alkaline

Bw horizon

Hue: 10YR
Value: 4 to 6
Chroma: 2 to 4
Texture: Loam, silt loam, silty clay loam, or clay loam
Calcium carbonate equivalent: 10 to 15 percent
Effervescence: Slight to violent
Reaction: Slightly alkaline to moderately alkaline

Bk horizon

Hue: 10YR
Value: 5 to 7
Chroma: 2 to 4
Texture: Loam, silt loam, silty clay loam, or clay loam
Calcium carbonate equivalent: 15 to 30 percent
Effervescence: Slight to violent
Reaction: Slightly alkaline to moderately alkaline

BCk horizon

Hue of 10YR or 2.5Y
Value: 6 to 8
Chroma: 2 to 4
Texture: Silt loam, loam, or silty clay loam
Calcium carbonate equivalent: 10 to 30 percent
Effervescence: Slight to violent
Reaction: Slightly alkaline to moderately alkaline

2Cd horizon

Hue: 10YR to 5Y
Value: 7 or 8
Chroma: 2 to 4
Cementation: Weakly cemented siltstone that slakes in water within 1 hour
Excavation difficulty: Low to moderate
Calcium carbonate equivalent: 10 to 20 percent
Effervescence: Slightly alkaline to moderately alkaline
Reaction: Slightly alkaline or moderately alkaline

Clareville Series

Depth class: Very deep
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.2 to 0.6 in/hr (moderately slow)
Landscape: Inland, dissected coastal plains
Landform: Drainageways
Parent material: Loamy alluvium
Slope: 1 to 2 percent
Elevation: 100 to 400 feet
Mean annual precipitation: 25 to 34 inches
Mean annual air temperature: 70 to 75 degrees F
Frost-free period: 250 to 300 days

Taxonomic Class

Fine, smectitic, hyperthermic Pachic Argiustolls

Typical Pedon

Clareville sandy clay loam (fig. 26) in an area of Czar-Clareville complex, 0 to 2 percent slopes, rarely flooded; La Chusa Hill, Texas USGS topographic quadrangle; Longitude: 28 degrees, 12 minutes, 7.63 seconds North; Longitude: 98 degrees, 22 minutes, 42.37 seconds West. UTM Easting: 561000 meters, UTM Northing: 3119749 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 12 inches; very dark gray (10YR 3/1) sandy clay loam, black (10YR 2/1) moist; moderate fine and medium subangular blocky structure; firm, slightly hard, moderately sticky, moderately plastic; common very fine and fine roots; common fine tubular pores; nonffervescent; slightly alkaline; clear smooth boundary.

Bt—12 to 41 inches; very dark gray (10YR 3/1) clay loam, black (10YR 2/1) moist; moderate medium prismatic structure parting to moderate medium angular blocky; firm, slightly hard, moderately sticky, moderately plastic; common very fine roots; common very fine tubular pores; 15 percent distinct clay films; slightly effervescent; slightly alkaline; gradual wavy boundary.

Btk—41 to 80 inches; dark grayish brown (10YR 4/2) sandy clay loam, dark grayish brown (10YR 4/2) moist; weak coarse subangular blocky structure; firm, hard, moderately sticky, moderately plastic; common very fine roots; common very fine tubular pores; 25 percent prominent clay films on all faces of peds; 3 percent fine carbonate masses; strong effervescence; moderately alkaline.

Range in Characteristics

Soil moisture: A typic ustic moisture regime. The soil moisture control section is dry in some or all parts for more than 90 days but less than 180 cumulative days in normal years. June through August and December through February are the driest months. These soils are intermittently moist in September through November and March through May.

Solum thickness: 60 to 80 inches
Thickness of mollic epipedon: 20 to 50 inches
Depth to secondary calcium carbonate: 24 to 36 inches
Particle-size control section (weighted average):
  Clay content: 35 to 45 percent

A horizon

Hue: 10YR
Value: 2 to 4
Chroma: 1 to 3
Texture: Loam, sandy clay loam, or clay loam
Effervescence: None and very slight
Reaction: Neutral or slightly alkaline

Bt horizon

Hue: 7.5YR or 10YR
Value: 2 to 4
Chroma: 1 or 2
Texture: Sandy clay loam, clay loam, sandy clay, or clay
Effervescence: None to slight
Reaction: Neutral or slightly alkaline

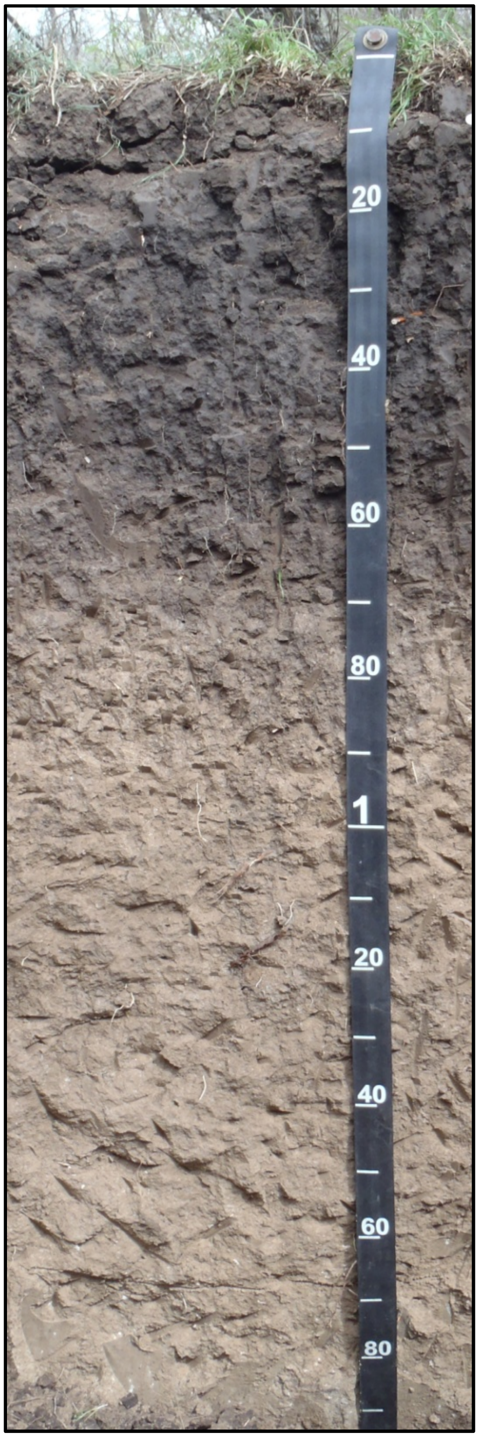

Figure 26.—Profile of Clareville sandy clay loam in an area of Czar-Clareville complex, 0 to 2 percent slopes, rarely flooded. The rich dark surface of this profile indicates an accumulation of organic matter and is naturally fertile. Clareville soils are on drainageways. (Scale in cm-centimeters)

Btk or Bk horizons

Hue: 7.5YR or 10YR
Value: 3 to 6 (increases with depth)
Chroma: 1 to 4 (increases with depth)
Texture: Sandy clay loam, clay loam, sandy clay, or clay
Calcium carbonate equivalent: 5 to 30 percent
Effervescence: None to strong
Reaction: Slightly alkaline to moderately alkaline

BCk horizon (where present)

Hue: 7.5YR or 10YR
Value: 5 to 8
Chroma: 2 to 6
Texture: Loam, clay loam, or sandy clay loam
Calcium carbonate equivalent: 15 to 50 percent
Effervescence: None to strong
Reaction: Slightly alkaline to moderately alkaline

Cochina Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability class of the most limiting soil layer: 0.001 to 0.06 in/hr (very slow)
Landscape: River valleys
Landform: Flood plains, flood-plain steps
Parent material: Calcareous clayey alluvium
Slope: 0 to 1 percent
Elevation: 140 to 410 feet
Mean annual precipitation: 20 to 25 inches
Mean annual air temperature: 70 to 72 degrees F
Frost-free period: 265 to 280 days

Taxonomic Class

Very-fine, smectitic, hyperthermic Sodic Haplusterts

Typical Pedon

Cochina clay (fig. 27) in an area of Cochina clay, 0 to 1 percent slopes, occasionally flooded; Fitzpatrick Hollow, Texas USGS topographic quadrangle; Longitude: 28 degrees, 16 minutes, 14.75 seconds North; Longitude: 98 degrees, 34 minutes, 56.34 seconds West. UTM Easting: 540965 meters, UTM Northing: 3127268 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 4 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; moderate fine subangular blocky structure; very firm, very hard, very sticky, very plastic; common very fine and common fine roots; common fine interstitial pores; strong effervescence; slightly alkaline; slightly saline; gradual smooth boundary.

Bnss1—4 to 17 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; moderate medium angular blocky structure; very firm, very hard, very sticky, very plastic; common very fine and common fine roots; common fine interstitial pores; 15 percent distinct slickensides (pedogenic); strong effervescence; moderately alkaline; moderately saline; gradual smooth boundary.

Bnss2—17 to 33 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; weak medium angular blocky structure; very firm, very hard, very sticky, very

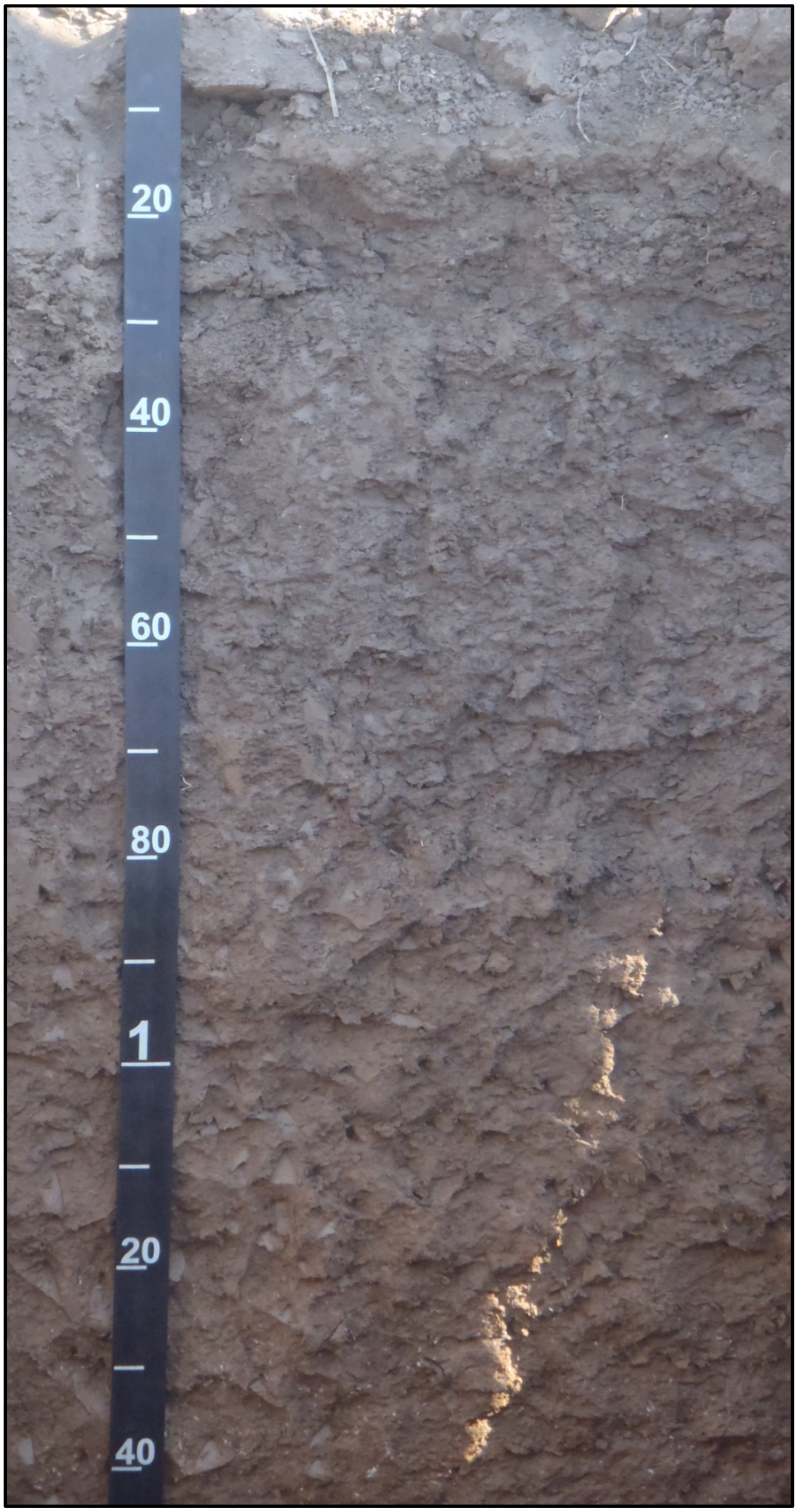

Figure 27.—Profile of Cochina clay, 0 to 1 percent slopes, occasionally flooded. Cochina soils formed in calcareous clayey alluvium. These soils are clayey throughout and classified as vertisols. (Scale in cm-centimeters)

plastic; common fine and few very fine roots; common very fine interstitial pores; 15 percent prominent slickensides (pedogenic); strong effervescence; strongly saline; moderately alkaline; gradual smooth boundary.

Bnssz—33 to 80 inches; pale brown (10YR 6/3) clay, brown (10YR 5/3) moist; weak coarse subangular blocky structure; very firm, very hard, very sticky, very plastic; few very fine and few fine roots; 10 percent prominent slickensides (pedogenic); 2 percent fine salt crystals in matrix; strong effervescence; moderately alkaline; strongly saline.

Range in Characteristics

Soil moisture: An aridic ustic moisture regime. The soil moisture control section is moist in some or all parts for less than 90 consecutive days in normal years. June to August and December to February are the driest months, while September to November and March to May are the wettest months.
Solum thickness: 60 to 80 inches
Particle-size control section (weighted average):
Clay content: 60 to 80 percent
Vertic features: Cracks 1/4 inch to 3 inches wide

A and BA horizons

Hue: 10YR or 2.5Y
Value: 5 or 6
Chroma: 2 to 4
Texture: Clay loam or clay
EC (dS/m): 0 to 4
SAR: 2 to 15
Effervescence: Slight or strong
Reaction: Slightly alkaline or moderately alkaline

Bnssz horizon

Hue: 10YR or 2.5Y
Value: 5 to 7
Chroma: 2 to 4
Texture: Clay
EC (dS/m): 4 to 16
SAR: 13 to 30
Effervescence: Slight or strong
Reaction: Slightly alkaline or moderately alkaline

Bnssyz horizon (where present)

Hue: 10YR or 2.5Y
Value: 5 to 7
Chroma: 2 to 4
Texture: Clay
Other features: Most pedons contain few to common vertical streaks similar to the A horizon in color and texture.
EC (dS/m): 4 to 16
Gypsum: 0 to 2 percent
SAR: 13 to 55
Effervescence: Slight to violent
Reaction: Slightly alkaline or moderately alkaline

Colmena Series

Depth class: Very deep
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.6 to 2.0 in/hr (moderate)
Landscape: Inland, dissected coastal plains
Landform: Paleoterraces remnants
Parent material: Loamy alluvium over calcareous loamy alluvium of Quaternary age
Slope: 0 to 3 percent
Elevation: 250 to 750 feet
Mean annual precipitation: 24 to 27 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 260 to 320 days

Taxonomic Class

Fine-loamy, mixed, superactive, hyperthermic Typic Argiustolls

Typical Pedon

Colmena fine sandy loam in an area of Colmena fine sandy loam, 0 to 3 percent slopes; Cross, Texas USGS topographic quadrangle; Longitude: 28 degrees, 37 minutes, 2.68 seconds North; Longitude: 98 degrees, 32 minutes, 16.26 seconds West. UTM Easting: 545178 meters, UTM Northing: 3165687 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

Ap—0 to 9 inches; dark brown (10YR 3/3), fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; very friable, slightly hard, very friable; common fine and many very fine roots; common fine interstitial pores; slightly acid; clear smooth boundary.

Bt1—9 to 19 inches; very dark grayish brown (10YR 3/2), sandy clay loam, very dark brown (10YR 2/2) moist; moderate medium subangular blocky structure; slightly hard, friable; common very fine roots; common very fine tubular pores; 10 percent distinct very dark brown (10YR 2/2) clay films on all faces of peds; neutral; clear smooth boundary.

Bt2—19 to 29 inches; brown (10YR 4/4) sandy clay loam, dark yellowish brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate medium angular blocky; hard, firm; common very fine roots; common very fine tubular pores; 10 percent distinct brown (10YR 4/3) clay films on all faces of peds; noneffervescent; moderately alkaline; gradual wavy boundary.

2Btk—29 to 40 inches; light yellowish brown (10YR 6/4) sandy clay loam, brown (10YR 5/3) moist; strong coarse prismatic structure parting to strong coarse angular blocky structure; hard, firm; 15 percent distinct brown (7.5YR 4/4) clay films on vertical faces of peds; 1 percent fine carbonate nodules and 8 percent medium carbonate masses; strong effervescence; moderately alkaline; gradual wavy boundary.

2Bk1—40 to 48 inches; reddish yellow (7.5YR 6/6) sandy clay loam, light brown (7.5YR 6/4) moist; weak coarse prismatic structure parting to moderate coarse subangular blocky structure; hard, firm; 1 percent fine carbonate nodules and 10 percent medium carbonate masses; strong effervescence; moderately alkaline; gradual smooth boundary.

2Bk2—48 to 80 inches; reddish yellow (7.5YR 6/8) loam, reddish yellow (7.5YR 6/6) moist; weak coarse subangular blocky structure; slightly hard, friable; 1 percent fine prominent black (10YR 2/1) iron-manganese masses with sharp boundaries in matrix; 2 percent coarse carbonate masses; strong effervescence; moderately alkaline.

Range in Characteristics

Soil moisture: A typic ustic moisture regime. The soil moisture control section is dry in some or all parts for more than 90 days but less than 180 cumulative days in normal years. June through August and December through February are the driest months. These soils are intermittently moist in September through November and March through May.
Depth to argillic horizon: 5 to 15 inches
Depth to secondary calcium carbonate: 29 to 65 inches
Particle-size control section (weighted average):
  Clay content: 20 to 32 percent

A horizon

Hue: 10YR
Value: 2 or 3
Chroma: 1 to 3
Texture: Loamy fine sand or fine sandy loam
Clay content: 8 to 19 percent
Rock fragments: 0 to 5 percent
Calcium carbonate equivalent: 0 to 5 percent
EC (dS/m): 0 to 3
SAR: 0 to 4
Effervescence: Noneffervescence
Reaction: Slightly acid to slightly alkaline

Bt horizon

Hue: 7.5YR or 10YR
Value: 3 to 7
Chroma: 1 to 4
Texture: Sandy clay loam or clay loam
Clay content: 20 to 32 percent
Clay films: 4 to 8 percent, along faces of peds and in matrix, faint to distinct
Redox concentrations: 0 to 10 percent, fine and medium,distinct, prominent, and clear, ped faces and along root channels
Rock fragments: 0 to 5 percent
Calcium carbonate equivalent: 0 to 5 percent
EC (dS/cm): 0 to 3
SAR: 0 to 4
Effervescence: None to slight
Reaction: Neutral to moderately alkaline

2Bk or 2Btk horizons

Hue: 7.5YR or 10YR
Value: 4 to 8
Chroma: 2 to 8
Texture: Loam or sandy clay loam
Clay content: 20 to 32 percent
Clay films: 3 to 5 percent, faint, on surfaces along pores
Calcium carbonate equivalent: 5 to 15 percent
Secondary carbonates: 2 to 20 percent threads, fine to coarse, masses and nodules, infused in matrix and faces of peds
EC (dS/m): 0 to 1
SAR: 2 to 4
*Effervescence: S*light to violent
Reaction: Slightly alkaline or moderately alkaline

Conquista Series

Depth class: Very deep
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.001 to 0.06 in/hr (very slow)
Landscape: Inland, dissected coastal plains
Landform: Reclaimed lands
Parent material: Mine spoil or earthy fill
Slope: 1 to 3 percent
Elevation: 230 to 550 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Taxonomic Class

Fine-loamy, mixed, superactive, hyperthermic Entic Haplustolls

Typical Pedon

Conquista clay in an area of Conquista clay, 1 to 3 percent slopes; Cross NE, Texas USGS topographic quadrangle; Longitude: 28 degrees, 38 minutes, 28.88 seconds North; Longitude: 98 degrees, 30 minutes, 6.37 seconds West. UTM Easting: 548695 meters, UTM Northing: 3168353 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 19 inches; very dark brown (10YR 2/2) clay, black (10YR 2/1) moist; moderate fine subangular blocky structure; 5 percent channers; very slight effervescence; slightly alkaline; abrupt smooth.

2Ck—19 to 80 inches; pinkish white (5YR 8/2) gravelly loam, pink (7.5YR 7/4) moist; massive; slightly hard; very friable; slightly sticky; plastic; few very fine roots; common fine and coarse masses of calcium carbonate; 30 percent hard siltstone fragments from 1/4 inch to 3 inches across; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil moisture: A typic ustic moisture regime. The soil moisture control section is dry in some or all parts for more than 90 days but less than 180 cumulative days in normal years. June through August and December through February are the driest months. These soils are intermittently moist in September through November and March through May.
Solum thickness: 60 to more than 80 inches
Particle-size control section (weighted average):
  Clay content: 18 to 35

A horizon

Hue: 10YR
Value: 2 to 4
Chroma: 1 or 2
Texture: Clay loam or clay
Clay content: 30 to 55 percent
Secondary carbonates: 2 percent, fine, masses
Rock fragments: 0 to 5 percent; soft shale, siltstone, or siliceous parachanners and paragravel
Effervescence: None to violent
Reaction: Slightly alkaline or moderately alkaline.

2C horizon

Hue: 5YR to 2.5Y
Value: 6 to 8
Chroma: 2 to 4
Texture: Very fine sandy loam, loam, sandy clay loam, or clay loam or their gravelly counterparts; most of this material slakes in water.
Other features: 2C soil materials are from the Catahoula Formation, Frio Formation, Jackson Group, and Claiborne Group
Rock fragments: 5 to 35 percent by volume, consisting of weakly to strongly cemented siltstone and sandstone, ranging from 1/4 inch to 3 inches across. The interior of some coarse fragments is noncalcareous.
SAR: 0 to 8
Effervescence: Strong or violent
Reaction: Moderately alkaline or strongly alkaline

Copita Series

Depth class: Moderately deep to paralithic bedrock
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.6 to 2.0 in/hr (moderate)
Landscape: Inland, dissected coastal plains
Landform: Interfluves
Parent material: Residuum weathered from calcareous sandstone
Slope: 1 to 5 percent
Elevation: 550 to 880 feet
Mean annual precipitation: 22 to 27 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 270 to 320 days

Taxonomic Class

Fine-loamy, mixed, superactive, hyperthermic Aridic Calciustepts

Typical Pedon

Copita sandy clay loam in an area of Copita sandy clay loam, 1 to 5 percent slopes; Piedra Creek NE, Texas USGS topographic quadrangle; Longitude: 28 degrees, 11 minutes, 35.99 seconds North; Longitude: 98 degrees, 45 minutes, 6.08 seconds West. UTM Easting: 524371 meters, UTM Northing: 3118644 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

Ap—0 to 3 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 5/3) moist; weak fine granular structure; friable, hard, nonsticky, nonplastic; common fine roots; strong effervescence; moderately alkaline; abrupt smooth boundary.
A—3 to 9 inches; light brownish gray (10YR 6/2) sandy clay loam, grayish brown (10YR 5/2) moist; medium subangular blocky structure; friable, hard, slightly sticky, slightly plastic; common fine roots; strong effervescence; moderately alkaline; clear wavy boundary.
Bk1—9 to 23 inches; grayish brown (10YR 5/2) sandy clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; friable, hard, slightly sticky, slightly plastic; 15 percent fine threadlike carbonate masses; violent effervescence; moderately alkaline; clear wavy boundary.
Bk2—23 to 35 inches; brown (10YR 5/3) sandy clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; friable, hard, slightly sticky, slightly plastic; 20 percent medium carbonate masses; violent effervescence; moderately alkaline; clear wavy boundary.

Crk—35 to 80 inches; light gray (10YR 7/2) weakly cemented calcareous sandstone bedrock, light gray (10YR 7/2) moist; massive; 20 percent carbonate masses on rock fragments; violent effervescence; moderately alkaline.

Range in Characteristics

Soil moisture: An aridic ustic moisture regime. The soil moisture control section is moist in some or all parts for less than 90 consecutive days in normal years. June to August and December to February are the driest months, while September to November and March to May are the wettest months.
Solum thickness: 20 to 40 inches
Depth to paralithic/densic contact: 20 to 40 inches
Depth to calcic horizon: 6 to 18 inches
Particle-size control section (weighted average):
  Clay content: 20 to 30 percent
  Rock fragments: 0 to 5 percent
CEC to clay ratio: 0.40 to 0.60

A horizon

Hue: 7.5YR to 2.5Y
Value: 4 to 7
Chroma: 2 to 4
Texture: Fine sandy loam or sandy clay loam
Clay content: 14 to 20 percent
Calcium carbonate equivalent: 1 to 10 percent
EC (dS/m): 0 to 2
Gypsum: 0 to 1 percent
SAR: 0 to 1
Effervescence: Slight to strong
Reaction: Moderately alkaline

Bk horizon

Hue: 7.5YR to 2.5Y
Value: 4 to 7
Chroma: 2 to 4
Texture: Fine sandy loam, loam, or sandy clay loam
Clay content: 20 to 30 percent
Calcium carbonate equivalent: 15 to 35 percent
Secondary carbonate: 1 to 25 percent, fine to medium, films, threads, and masses on surfaces of peds and as coatings on coarse fragments
EC (dS/m): 2 to 8
Gypsum: 0 to 2 percent
SAR: 0 to 12
Effervescence: Strong or violent
Reaction: Moderately alkaline

Cr layer

Kind: Sandstone bedrock or noncemented sandy densic material that slakes in water
Cementation: Weakly cemented to moderately cemented
Other features: Can be dug with a spade with difficulty, when moist, in some pedons

R layer

Kind: Sandstone bedrock
Cementation: Strongly cemented

Coquat Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability class of the most limiting soil layer: 0.001 to 0.06 in/hr (very slow)
Landscape: River valleys
Landform: Circular gilgai on flood plains
Parent material: Calcareous, sodic clayey alluvium
Slope: 0 to 1 percent
Elevation: 230 to 500 feet
Mean annual precipitation: 20 to 24 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 260 to 290 days

Taxonomic Class

Fine, smectitic, hyperthermic Sodic Haplusterts

Typical Pedon

Coquat clay in an area of Coquat clay, 0 to 1 percent slopes, frequently flooded; in shrub cover; USGS Caiman Creek NE, Texas USGS topographic quadrangle; Longitude: 28 degrees 9 minutes 25.24 seconds North; Longitude: 99 degrees 1 minutes 4.84 seconds West. UTM 498232 meters E, 3114596 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 5 inches; grayish brown (10YR 5/2) clay, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure; very firm, very hard, very sticky, very plastic; common very fine roots and fine roots; strong effervescence; moderately alkaline; gradual wavy boundary.

Bknss—5 to 36 inches; 15 percent grayish brown (10YR 5/2) and 85 percent light brownish gray (10YR 6/2) clay, grayish brown (10YR 5/2) moist; moderate fine angular blocky structure; very firm, extremely hard, very sticky, very plastic; very fine and fine roots; 5 percent slickensides (pedogenic); 3 percent fine distinct spherical strongly cemented carbonate nodules with clear boundaries in matrix; strong effervescence; moderately alkaline; diffuse wavy boundary.

Bknssz1—36 to 52 inches; 30 percent grayish brown (10YR 5/2) and 70 percent pale brown (10YR 6/3) clay, brown (10YR 5/3) moist; weak medium subangular blocky structure parting to moderate fine angular blocky structure; very firm, extremely hard, very sticky, very plastic; common very fine and fine roots; 5 percent slickensides (pedogenic); 3 percent fine distinct spherical weakly cemented iron-manganese nodules in matrix; 3 percent fine distinct spherical strongly cemented carbonate nodules with clear boundaries in matrix; strong effervescence; moderately alkaline; diffuse wavy boundary.

Bknssz2—52 to 65 inches; 30 percent brown (10YR 5/3) and 70 percent pale brown (10YR 6/3) clay, brown (10YR 5/3) moist; moderate fine angular blocky structure; very firm, extremely hard, very sticky, very plastic; few very fine and fine roots; 5 percent slickensides (pedogenic); 3 percent fine distinct spherical strongly cemented carbonate nodules with clear boundaries in matrix; strong effervescence; moderately alkaline; diffuse wavy boundary.

BCknz—65 to 80 inches; 30 percent brown (10YR 5/3) and 70 percent light yellowish brown (10YR 6/4) clay, yellowish brown (10YR 5/4) moist; weak medium subangular blocky structure; very firm, extremely hard, very sticky, very plastic; few very fine and fine roots; 3 percent fine distinct spherical strongly cemented carbonate nodules with clear boundaries in matrix; 2 percent fine distinct spherical gypsum crystal clusters with clear boundaries in matrix, and 1 percent fine distinct spherical salt masses with clear boundaries in matrix; strong effervescence; moderately alkaline.

Range in Characteristics

Soil moisture: An udic ustic soil moisture regime. The soil moisture control section remains dry in some or all parts for 90 or more but less than 180 cumulative days in normal years. December through March are the driest months, while May and June are the wettest.
Solum thickness: 60 to more than 80 inches
Vertic features: Horizontal variations of the soil surface within a pedon are 2 to 12 inches, and expressed as gilgai microrelief. The soil cracks 1/4 inch to 3 inches wide at the surface, when dry, and the cracks extend to a depth of more than 20 inches.
EC (dS/m): Upper 30 inches—0.2 to 4; below 30 inches—4 to 16
ESP: 15 or more in some part of the upper 30 inches of the solum

A horizon

Hue: 10YR
Value: 4 to 6
Chroma: 1 to 3
Other features: Horizons with chroma of 1 are less than 10 inches thick
Texture: Clay
Clay content: 45 to 60 percent
Effervescence: Slightly effervescence to strongly effervescence
Reaction: Moderately alkaline

Bknss and Bknssz horizons

Hue: 10YR
Value: 5 to 7
Chroma: 2 or 3
Other features: The B horizon has common to many streaks with colors of the A horizon
Texture: Clay
Clay content: 45 to 60 percent
Effervescence: Slightly effervescence to strongly effervescence
Reaction: Moderately alkaline

BCknz and C horizons (where present)

Hue: 10YR
Value: 5 to 7
Chroma: 2 to 3
Texture: Clay
Clay content: 45 to 60 percent
Redoximorphic features: 5 percent faint to distinct, fine to medium, in shades of brown, yellow, or gray
Effervescence: Slightly effervescence to strongly effervescence
Reaction: Moderately alkaline

Cotulla Series

Depth class: Very deep to dense material
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.001 to 0.06 in/hr (very slow)
Landscape: Inland, dissected coastal plains
Landform: Interfluves
Parent material: Calcareous, sodic clayey residuum weathered from shale

Slope: 0 to 3 percent
Elevation: 230 to 620 feet
Mean annual precipitation: 21 to 28 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 261 to 301 days

Taxonomic Class

Fine, smectitic, hyperthermic Sodic Haplusterts

Typical Pedon

Cotulla clay loam (fig. 28) in an area of Cotulla clay loam, 0 to 3 percent slopes; in shrub cover; USGS Pertle Creek, Texas USGS topographic quadrangle; Longitude: 28 degrees, 33 minutes, 14.30 seconds North; Longitude: 98 degrees, 44 minutes, 1.33 seconds West. UTM Easting: 526048 meters, UTM Northing: 3158600 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 4 inches; very dark grayish brown (10YR 3/2) clay loam, very dark brown (10YR 2/2) moist; moderate fine subangular blocky structure; firm, moderately hard, moderately sticky, moderately plastic; common very fine and common fine roots; strong effervescence; slightly alkaline; non-saline; clear smooth boundary.

Bknss1—4 to 13 inches; dark gray (10YR 4/2) clay, dark grayish brown (10YR 4/2) moist; moderate thick wedge structure; firm, hard, very sticky, very plastic; common very fine and common fine roots; strong effervescence; moderately alkaline; slightly saline; gradual wavy boundary.

Bknss2—13 to 32 inches; grayish brown (10YR 5/2) clay, dark gray (10YR 4/1) moist; moderate coarse angular blocky structure; firm, very hard, very sticky, very plastic; common very fine and common fine roots; 1 percent fine distinct irregular pale yellow (2.5Y 8/2) moist, carbonate masses with diffuse boundaries in matrix; strong effervescence; slightly alkaline; clear wavy boundary.

Bnssyz1—32 to 44 inches; very pale brown (10YR 7/4) clay, very pale brown (10YR 7/4) moist; moderate medium wedge structure; firm, very hard, moderately sticky, very plastic; common very fine roots; 10 percent distinct pressure faces on all faces of peds; 1 percent fine distinct platy pale yellow (2.5Y 8/2) moist, gypsum crystals; 8 percent fine distinct irregular white (2.5Y 8/1) salt masses with clear boundaries in matrix, 2 percent medium distinct irregular white (2.5Y 8/1) moist, salt masses with clear boundaries in matrix, and 3 percent coarse distinct irregular white (2.5Y 8/1) moist, salt masses with sharp boundaries in matrix; strong effervescence; moderately alkaline; moderately saline; gradual smooth boundary.

Bnssyz2—44 to 60 inches; very pale brown (10YR 7/3) clay, very pale brown (10YR 7/3) moist; moderate coarse wedge structure; very firm, very hard, very sticky, very plastic; few very fine roots; 15 percent distinct pressure faces on all faces of peds; 5 percent fine faint platy light gray (2.5Y 7/2) moist, gypsum crystals; 30 percent coarse distinct irregular white (2.5Y 8/1) moist, salt masses in matrix; strong effervescence; moderately alkaline; gradual smooth boundary.

BCyz—60 to 71 inches; pale yellow (2.5Y 7/3) clay, light yellowish brown (2.5Y 6/3) moist; moderate coarse subangular blocky structure; firm, very hard, moderately sticky, very plastic; few very fine roots; 2 percent medium distinct irregular reddish yellow (7.5YR 6/8) moist, masses of oxidized iron in matrix; 15 percent fine distinct irregular white (2.5Y 8/1) moist, salt masses with clear boundaries in matrix and 1 percent fine distinct platy light gray (2.5Y 7/2) moist, gypsum crystals with sharp boundaries in matrix; 2 percent chert gravel; strong effervescence; moderately alkaline; moderately saline; gradual smooth boundary.

Cdyz—71 to 80 inches; pale olive (5Y 6/3) mudstone that has clay texture, pale olive (5Y 6/3) moist; massive; firm, hard, moderately sticky, moderately plastic; strong effervescence; strongly saline; moderately alkaline.

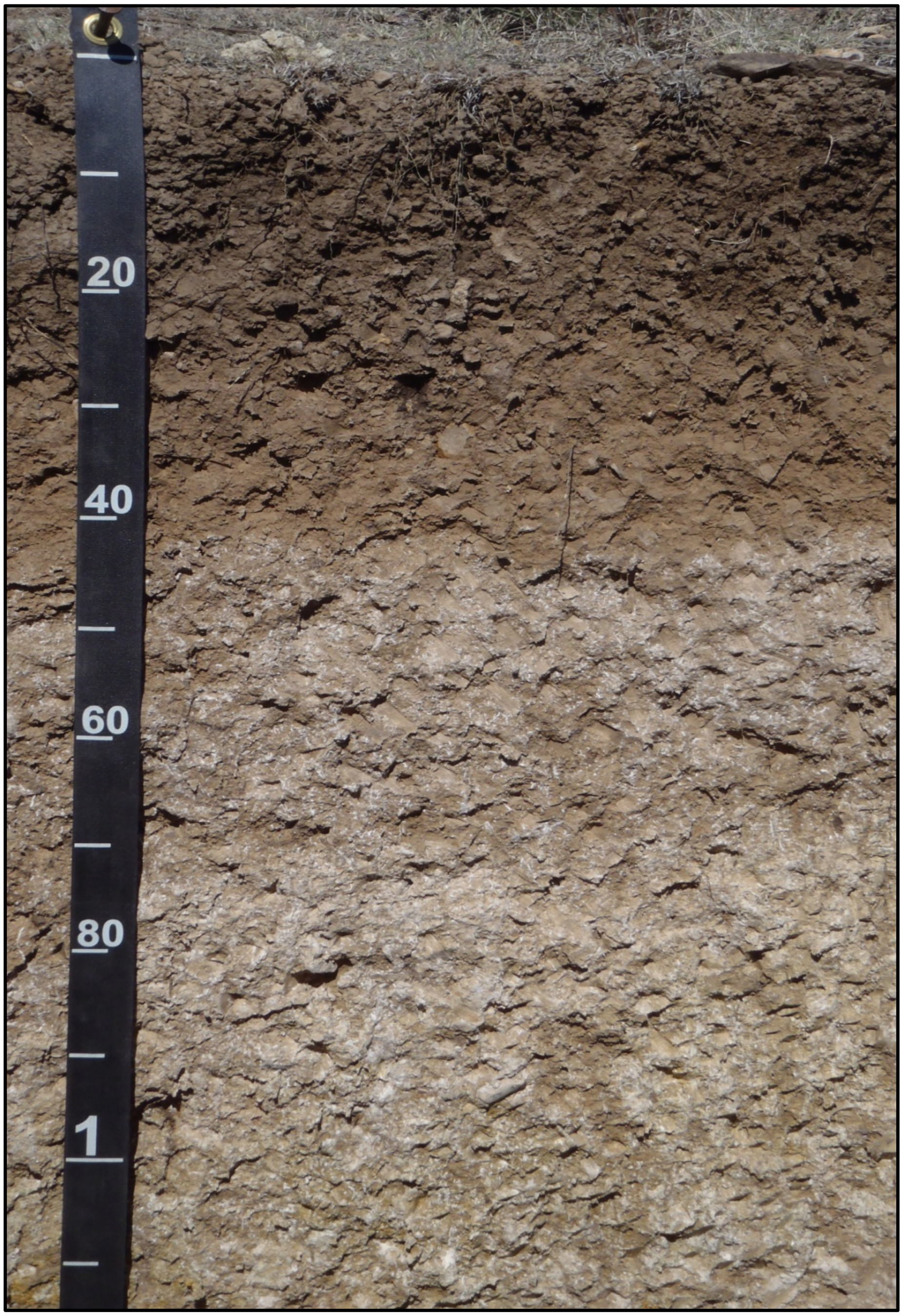

Figure 28.—Profile of Cotulla clay loam, 0 to 3 percent slopes. Cotulla soils have clay loam surfaces over clayey subsoils. Accumulations of carbonates, salts, and gypsum begin at around 18 inches (45 cm). (Scale in cm-centimeters)

Range in Characteristics

Soil moisture: An aridic ustic moisture regime. The soil moisture control section is moist in some or all parts for less than 90 consecutive days in normal years. June to August and December to February are the driest months, while September to November and March to May are the wettest months.

Solum thickness: 60 to 80 inches
Depth to slickensides: 4 to 15 inches
Vertic features: The soil cracks 1/4 inch to 2 inches wide at the surface when dry and the cracks extend to a depth of 20 inches or more.
Depth to salt accumulations: 10 to 33 inches. Salinity increases with depth in the upper 40 inches
ESP: 15 or more in the upper 40 inches of the solum
SAR: 13 in the upper 40 inches of the solum
Particle-size control section (weighted average):
  Clay content: 35 to 60 percent
CEC to clay ratio: Greater than 0.60

A horizon

Hue: 10YR or 2.5 Y
Value: 3 to 6
Chroma: 2 to 4
Texture: Clay
Clay content: 40 to 50
Calcium carbonate equivalent: 2 to 12 percent
EC (dS/m): 0 to 4
SAR: 0 to 2
Effervescence: Slight or strong
Reaction: Moderately alkaline

Bw horizon (where present)

Hue: 10 YR to 2.5Y
Value: 3 to 6
Chroma: 2 to 4
Texture: Clay
Clay content: 40 to 60 percent
Calcium carbonate equivalent: 12 to 17 percent
EC (dS/m): 0.5 to 5
SAR: 1 to 4
Effervescence: Slight or strong
Reaction: Moderately alkaline

Bnss or Bky horizons

Hue: 10YR or 2.5Y
Value: 5 to 8
Chroma: 1 to 6
Texture: Clay
Clay content: 40 to 60 percent
Vertic features: Many streaks that have colors of the A and Bw horizons
Rock fragments: 0 to 2 percent, chert gravels
EC (dS/m): 4 to 16
Gypsum: 1 to 20 percent, crystals
Salt accumulations: 1 to 20, percent masses
SAR: 13 to 24
Effervescence: Strong
Reaction: Moderately alkaline

Cdyz horizon

Hue: 5Y
Value: 6 or 7

Chroma: 3 or 4
Texture: Clay
Clay content: 40 to 60 percent
Pararock fragments: 2 to 35 percent, mudstone parachanners
Salt accumulations: 2 to 50 percent, crystals and threads
EC (dS/m): 4 to 16
Gypsum: 1 to 10 percent, crystals
Salt accumulations: 1 to 20 percent, masses
SAR: 15 to 40
Effervescence: Slight or strong
Reaction: Moderately alkaline

Coy Series

Depth class: Very deep
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.001 to 0.06 in/hr (very slow)
Landscape: Inland, dissected coastal plains
Landform: Drainageways, interfluves
Parent material: Calcareous clayey alluvium derived from shale
Slope: 1 to 3 percent
Elevation: 160 to 620 feet
Mean annual precipitation: 21 to 28 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 261 to 301 days

Taxonomic Class

Fine, smectitic, hyperthermic Pachic Vertic Argiustolls

Typical Pedon

Coy clay loam in an area of Coy clay loam, 1 to 3 percent slopes; in shrub cover; Fitzpatrick Hollow, Texas USGS topographic quadrangle; Longitude: 28 degrees, 16 minutes, 55.23 seconds North; Longitude: 98 degrees, 33 minutes, 17.74 seconds West. UTM Easting: 543646 meters, UTM Northing: 3128523 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 8 inches; very dark gray (10YR 3/1) clay loam, black (10YR 2/1) moist; moderate coarse subangular blocky structure; very friable, slightly hard, moderately sticky, moderately plastic; many fine roots; slight effervescence; moderately alkaline; clear smooth boundary.

Bt—8 to 33 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; strong very coarse angular blocky structure; firm, hard, very sticky, very plastic; common fine roots; 25 percent distinct clay films on all faces of peds; strong effervescence; moderately alkaline; gradual wavy boundary.

Btk—33 to 48 inches; pale brown (10YR 6/3) clay, brown (10YR 5/3) moist; strong very coarse angular blocky structure; firm, hard, very sticky, very plastic; few fine roots; 25 percent distinct clay films on all faces of peds; 5 percent fine distinct carbonate masses in matrix; strong effervescence; moderately alkaline; gradual wavy boundary.

Bk—48 to 80 inches; very pale brown (10YR 7/3) clay loam, pale brown (10YR 6/3) moist; moderate fine subangular blocky structure; very friable, slightly hard, moderately sticky, slightly plastic; few fine roots; 75 percent distinct carbonate masses in matrix; violent effervescence; moderately alkaline.

Range in Characteristics

Soil moisture: A Typic ustic moisture regime. The soil moisture control section is dry in some or all parts for more than 90 days but less than 180 cumulative days in normal years. June through August and December through February are the driest months. These soils are intermittently moist in September through November and March through May.
Thickness of mollic epipedon: 20 to 45 inches
Vertic properties: When dry, the soil has cracks up to 2 inches wide at the surface that extends to depths of more than 40 inches
Depth to calcic horizon: 40 to 80 inches

A horizon

Hue: 10YR
Value: 2 to 4
Chroma: 1 or 2
Texture: Sandy clay loam, clay loam, or clay
Clay content: 25 to 45 percent
Silt content: 25 to 35 percent
Effervescence: Very slight or slight
Reaction: Slightly alkaline or moderately alkaline

BA horizon (where present)

Hue: 10YR
Value: 2 to 4
Chroma: 1 or 2
Texture: Sandy clay loam, clay loam, or clay
Clay content: 25 to 45 percent
Silt content: 25 to 35 percent
Effervescence: Slight
Reaction: Slightly alkaline or moderately alkaline

Bt horizon

Hue: 10YR
Value: 3 to 6
Chroma: 1 to 4
Texture: Clay loam, sandy clay, or clay
Clay content: 35 to 60 percent
Secondary calcium carbonate: 0 to 3 percent, masses, threads, and nodules
Effervescence: Slight to strong
Reaction: Slightly alkaline or moderately alkaline

Btk horizon

Hue: 7.5YR or 10YR
Value: 3 to 6
Chroma: 1 to 4
Texture: Clay loam, sandy clay, or clay
Clay content: 35 to 60 percent
Secondary calcium carbonate: 3 to 10 percent, masses, threads, and nodules
Effervescence: Slightly to strong
Reaction: Slightly alkaline or moderately alkaline

Bk or Bky horizon (where present)

Hue: 7.5YR or 10YR
Value: 5 to 7

Chroma: 2 to 6
Texture: Sandy clay loam, clay loam, silty clay, or clay
Clay content: 35 to 60 percent
Secondary calcium carbonate: 0 to 10 percent, masses and nodules
Gypsum: 0 to 5 percent, threads and films
Effervescence: Slight to violent
Reaction: Slightly alkaline or moderately alkaline

BC horizon (where present)

Hue: 7.5YR to 2.5Y
Value: 5 to 7
Chroma: 2 to 6
Texture: Silty clay or clay
Clay content: 40 to 60 percent
Secondary calcium carbonate: 1 to 15 percent, masses, films, and nodules
Gypsum: 0 to 10 percent, threads and films
Effervescence: Slight to violent
Reaction: Slightly alkaline to strongly alkaline

Czar Series

Depth class: Very deep
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.6 to 2.0 in/hr (moderate)
Landscape: Inland, dissected coastal plains
Landform: Drainageways
Parent material: Loamy alluvium of Quaternary age
Slope: 0 to 1 percent
Elevation: 300 to 700 feet
Mean annual precipitation: 22 to 29 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 250 to 300 days

Taxonomic Class

Fine-loamy, mixed, superactive, hyperthermic Pachic Argiustolls

Typical Pedon

Czar sandy clay loam in an area of Czar-Clareville complex, 0 to 2 percent slopes, rarely flooded; in shrub cover; Calliham NW, Texas USGS topographic quadrangle; Longitude: 28 degrees, 29 minutes, 58.70 seconds North; Longitude: 98 degrees, 27 minutes, 57.68 seconds West. UTM Easting: 552258 meters, UTM Northing: 3152668 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 5 inches; very dark grayish brown (10YR 3/2) sandy clay loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure; friable, slightly hard, slightly sticky, slightly plastic; common very fine and fine roots; many very fine and fine interstitial and tubular pores; slight effervescence; slightly alkaline; gradual smooth boundary.

Bt1—5 to 13 inches; very dark grayish brown (10YR 3/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; friable, slightly hard, slightly sticky, slightly plastic; common very fine roots; common very fine tubular pores; 10 percent distinct clay films; slight effervescence; moderately alkaline; clear smooth boundary.

Bt2—13 to 22 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; friable, slightly hard, slightly sticky, slightly plastic; common very fine roots; common very fine tubular pores; 10 percent distinct clay films; slight effervescence; moderately alkaline; clear smooth boundary.

Btk1—22 to 59 inches; brown (10YR 5/3) clay loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; friable, moderately hard, moderately sticky, moderately plastic; common very fine roots; common very fine tubular pores; 15 percent distinct clay films; 2 percent fine threadlike carbonate masses in matrix; strong effervescence; moderately alkaline; gradual smooth boundary.

Btk2—59 to 80 inches; very pale brown (10YR 7/4), clay loam, pale brown (10YR 6/3) moist; weak medium subangular blocky structure; firm, moderately hard, moderately sticky, moderately plastic; common very fine roots; common very fine tubular pores; 25 percent distinct clay films; 5 percent fine irregular carbonate masses in matrix; strong effervescence; moderately alkaline.

Range in Characteristics

Soil moisture: A typic ustic moisture regime. The soil moisture control section is dry in some or all parts for more than 90 but less than 180 cumulative days in normal years. June through August and December through February are the driest months. These soils are intermittently moist in September through November and March through May.

Thickness of the solum: More than 80 inches

Thickness of mollic epipedon: 20 to 30 inches

Depth to secondary carbonates: 36 to 80 inches

Other features: Some pedons have a loamy fine sand overburden less than 6 inches thick

A horizon

Hue: 10YR
Value: 2 to 4
Chroma: 1 to 3
Texture: Fine sandy loam or sandy clay loam
Effervescence: None to slight
Reaction: Moderately acid to slightly alkaline

Bt horizon

Hue: 7.5YR or 10YR
Value: 3 to 6
Chroma: 1 to 4
Texture: Fine sandy loam or sandy clay loam
Clay content: 18 to 28 percent
Effervescence: None to slight
Reaction: Neutral to moderately alkaline

Btk horizon

Hue: 7.5YR or 10YR
Value: 4 to 6
Chroma: 2 to 6
Texture: Sandy clay loam or clay loam
Clay content: 20 to 35 percent
Secondary carbonates: 1 to 12 percent, threads, masses and nodules, fine, infused in matrix and throughout
Effervescence: Very slight to strong
Reaction: Neutral to moderately alkaline

2Btk horizon (where present)

Hue: 7.5YR, 10YR or 2.5Y
Value: 4 to 8
Chroma: 2 to 6
Texture: Sandy clay loam or clay loam
Clay content: 20 to 35 percent
Secondary carbonates: 5 to 15 percent, threads, masses and nodules, fine or medium, infused in matrix and throughout
Effervescence: Slight to violent
Reaction: Slightly alkaline to strongly alkaline

Dosrios Series

Depth class: Very deep to dense material
Drainage class: Moderately well drained
Permeability class of the most limiting soil layer: 0.001 to 0.06 in/hr (very slow)
Landscape: Inland, dissected coastal plains
Landform: Broad interfluves
Parent material: Moderately saline clayey fluviomarine deposits over clayey residuum weathered from mudstone
Slope: 1 to 5 percent
Elevation: 160 to 540 feet
Mean annual precipitation: 21 to 28 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 261 to 301 days

Taxonomic Class

Fine, smectitic, hyperthermic Sodic Haplusterts

Typical Pedon

Dosrios clay (fig. 29) in an area of Dosrios clay, 1 to 3 percent slopes; in rangeland; Caballos Creek, Texas USGS topographic quadrangle; Longitude: 28 degrees, 38 minutes, 24.60 seconds North; Longitude: 98 degrees, 27 minutes, 44.11 seconds West. UTM Easting: 552557 meters, UTM Northing: 3168238 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 8 inches; dark grayish brown (10YR 4/2) clay, black (10YR 2/1) moist; moderate fine and medium angular blocky structure; extremely firm, extremely hard; many fine and many medium roots; common fine tubular pores; 2 percent chert gravel; slight effervescence; very slightly saline; slightly alkaline; clear smooth boundary.

Bss1—8 to 17 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; moderate medium and coarse angular blocky structure; extremely firm, extremely hard; common fine and common medium roots; common very fine tubular pores; 15 percent prominent slickensides (pedogenic); 2 percent chert gravel; slight effervescence; very slightly saline; slightly alkaline; clear wavy boundary.

Bss2—17 to 30 inches; very dark gray (10YR 3/1) clay, dark grayish brown (10YR 2/1) moist; moderate medium and coarse angular blocky structure; extremely firm, extremely hard; common fine and common medium roots; common very fine tubular and common fine tubular pores; 15 percent prominent slickensides (pedogenic); 2 percent chert gravel; violent effervescence; slightly saline; slightly alkaline; clear wavy boundary.

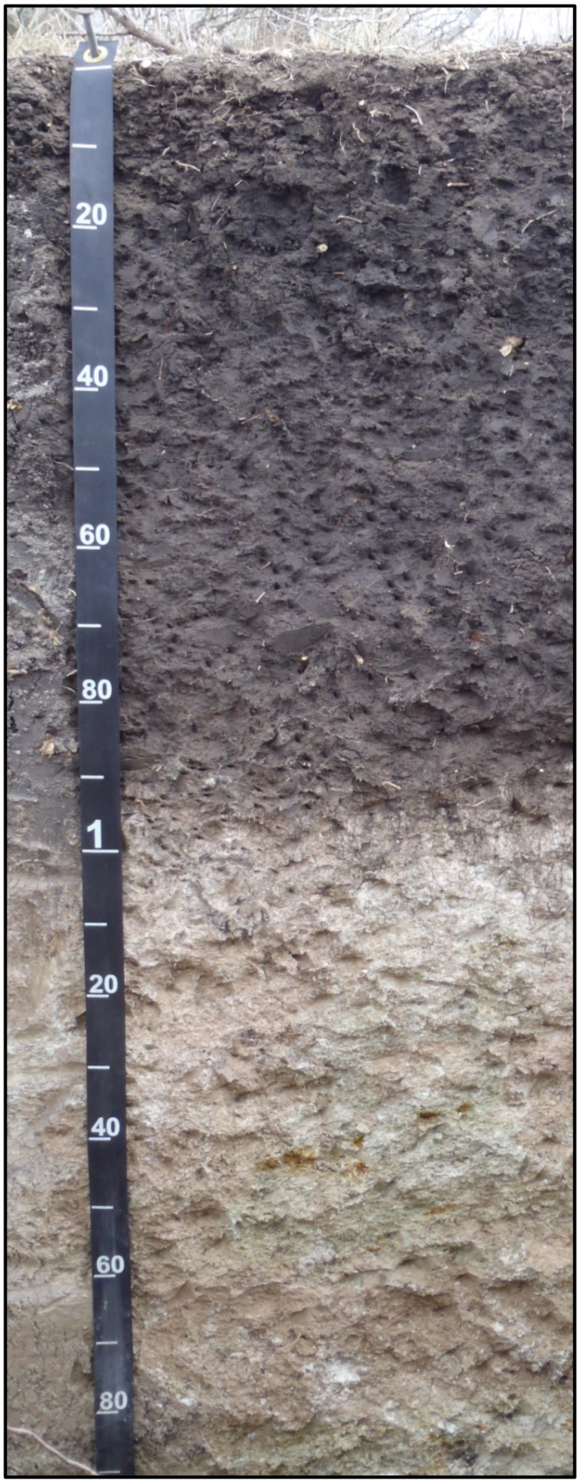

Figure 29.—Profile of Dosrios clay, 1 to 3 percent slopes in rangeland. Dosrios soils have very high shrink-swell properties because of the clayey textures. This soil formed out of two separate parent materials. (Scale in cm-centimeters)

Bkyz—30 to 54 inches; light yellowish brown (10YR 6/4) clay, pale brown (10YR 6/3) moist; moderate medium and coarse angular blocky structure; extremely firm, extremely hard; few fine and common very fine roots; 3 percent fine threadlike carbonate masses in cracks; 1 percent fine gypsum masses and 4 percent fine threadlike salt masses; violent effervescence; slightly saline; slightly alkaline; clear wavy boundary.

2BCkyz—54 to 70 inches; 50 percent light yellowish brown (10YR 6/4) and 50 percent pale olive (5Y 6/4) silty clay, pale olive (5Y 6/4) moist; moderate medium and coarse angular blocky structure; very firm, very hard; few very fine and few fine roots; 4 percent fine threadlike carbonate masses; 5 percent fine gypsum crystals, and 5 percent fine irregular salt masses; strong effervescence; moderately saline; moderately alkaline; abrupt smooth boundary.

2Cdyz—70 to 80 inches; pale olive (5Y 6/4) mudstone bedrock that has silty clay texture, pale olive (5Y/4) moist; massive; 7 percent fine gypsum masses; 7 percent medium salt masses; slight effervescence; strongly saline; moderately alkaline.

Range in Characteristics

Soil moisture: A typic ustic moisture regime. The soil moisture control section is dry in some or all parts for more than 90 but less than 180 cumulative days in normal years. June through August and December through February are the driest months. These soils are intermittently moist in September through November and March through May.

Depth to densic material: 63 to 75 inches
Depth to gypsic materials: 44 to 72 inches
Depth to lithologic discontinuity: 63 to 75 inches
Depth to secondary carbonates: 21 to 33 inches
Particle-size control section (weighted average):
  Clay content: 40 to 60 percent
  Rock fragments: 0 to 10 percent
Calcium carbonate equivalent: 2 to 25 percent

A horizon

Hue: 10YR
Value: 2 to 4
Chroma: 1 or 2
Texture: Clay loam or clay, or their gravelly counterparts
Clay content: 38 to 55
Rock fragments: 0 to 25 percent, siliceous pebbles
EC (dS/m): 1 to 4
Effervescence: Slight
Reaction: Slightly alkaline

Bss horizon

Hue: 10YR
Value: 2 to 6
Chroma: 1 to 3
Texture: Clay
Clay content: 40 to 60 percent
Rock fragments: 0 to 15 percent, siliceous pebbles
EC (dS/m): 2 to 8
SAR: 14 to 25
Effervescence: Very slightly to strong
Reaction: Slightly alkaline

Bkyz horizon

Hue: 10YR or 2.5Y
Value: 4 to 6
Chroma: 2 to 4
Texture: Clay or silty clay
Clay content: 40 to 60 percent
Calcium carbonate equivalent: 2 to 10
Secondary carbonates: 1 to 5 percent, very fine and fine threadlike masses
Rock fragments: 0 to 5 percent, siliceous pebbles
Gypsum: 0 to 2 percent
EC (dS/m): 8 to 16
SAR: 14 to 25
Effervescence: Slight to violent
Reaction: Slightly alkaline

2BCkyz horizon

Hue: 10YR to 5Y
Value: 4 to 7
Chroma: 2 to 4
Texture: Clay or silty clay
Clay content: 40 to 60 percent
Calcium carbonate equivalent: 2 to 10
Secondary carbonates: 1 to 10 percent, very fine, fine, and medium threadlike masses throughout
Rock fragments: 0 to 2 percent, siliceous pebbles
Gypsum: 0 to 5 percent
EC (dS/m): 4 to 16
SAR: 13 to 40
Effervescence: Slight to violent
Reaction: Slightly alkaline and moderately alkaline

2Cdyz horizon

Hue: 5YR to 5Y
Value: 4 to 8
Chroma: 1 to 4
Texture: Noncemented mudstone bedrock of clay or silty clay textures
Clay content: 40 to 60 percent
Rock fragments: 0 to 5 percent, cemented mudstone parachanners
Gypsum: 1 to 10 percent
EC (dS/m): 8 to 16
SAR: 13 to 35
Effervescence: Slight to violent
Reaction: Slightly alkaline to moderately alkaline

Eloso Series

Depth class: Deep to densic bedrock
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.001 to 0.06 in/hr (very slow)
Landscape: Inland, dissected coastal plains
Landform: Broad interfluves
Parent material: Clayey alluvium over weakly cemented siltstone
Slope: 0 to 3 percent

Elevation: 350 to 550 feet
Mean annual precipitation: 28 to 32 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 275 to 290 days

Taxonomic Class

Fine, smectitic, hyperthermic Vertic Haplustolls

Typical Pedon

Eloso clay in an area of Eloso clay, 0 to 3 percent slopes; in shrub cover; San Caja Hill, Texas USGS topographic quadrangle; Longitude: 28 degrees, 18 minutes, 13.18 seconds North; Longitude: 98 degrees, 23 minutes, 20.58 seconds West. UTM Easting: 559902 meters, UTM Northing: 3130993 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 9 inches; black (10YR 2/1) clay, black (10YR 2/1) moist; weak fine subangular blocky structure; firm, slightly hard, very sticky, very plastic; common very fine and common fine roots; neutral; clear smooth boundary.

Bw—9 to 17 inches; black (10YR 3/1) clay, black (10YR 2/1) moist; moderate medium subangular blocky structure; firm, slightly hard, very sticky, very plastic; common very fine roots; common very fine tubular pores; neutral; gradual smooth boundary.

Bk1—17 to 26 inches; dark gray (10YR 4/1) clay, (10YR 3/1) moist; moderate medium angular blocky structure; firm, slightly hard, very sticky, very plastic; common very fine roots; 1 percent fine threadlike white (10YR 8/1) carbonate nodules; strong effervescence; slightly alkaline; gradual wavy boundary

Bk2—26 to 37 inches; grayish brown (10YR 5/2) clay loam, (10YR4/2) moist; weak coarse subangular blocky structure; firm, moderately hard, very sticky, very plastic; and 2 percent medium threadlike white (10YR 8/1) carbonate masses; strong effervescence; slightly alkaline; gradual wavy boundary.

2Crk1—37 to 48 inches; 50 percent light brownish gray (2.5Y 6/2) and 50 percent very pale brown (10YR 7/4) loam, (10YR 6/3) moist; massive; slightly firm, moderately hard, very sticky, very plastic; 1 percent fine white (10YR 8/1) carbonate nodules and 5 percent medium white (10YR 8/1) carbonate masses; strong effervescence; moderately alkaline; gradual wavy boundary.

2Crk2—48 to 80 inches; 80 percent very pale brown (10YR 7/4) and 20 percent light brownish gray (2.5Y 6/2) noncalcareous weakly cemented siltstone with texture of silt loam, (10YR 7/3) moist; massive; slightly firm, moderately hard, very sticky, very plastic; 1 percent medium carbonate masses in cracks; very slight effervescence; moderately alkaline.

Range in Characteristics

Soil moisture: A typic ustic moisture regime. The soil moisture control section is dry in some or all parts for more than 90 days but less than 180 cumulative days in normal years. June through August and December through February are the driest months. These soils are intermittently moist in September through November and March through May.

Depth to paralithic contact: 20 to 40 inches

Linear extensibility: Ranges from 2.5 to 5 inches; when dry, cracks up to 1 inch wide extend to a depth of more than 20 inches

Particle-size control section (weighted average):
  Clay content: 40 to 55 percent

A horizon

Hue: 10YR
Value: 2 or 3

Chroma: 1 or 2
Texture: Clay loam or clay
Clay content: 35 to 55 percent
Secondary carbonate: 0 to 5 percent, concretions
Effervescence: None or slight
Reaction: Neutral or slightly alkaline

Bw horizon

Hue: 10YR
Value: 2 or 4
Chroma: 1 or 2
Texture: Clay or silty clay
Clay content: 40 to 55 percent
Secondary carbonate: 0 to 10 percent, concretions, films, masses, or threads
Effervescence: None or slight
Reaction: Slightly alkaline or moderately alkaline

Upper Bk horizon

Hue: 10YR
Value: 2 to 4
Chroma: 1 or 2
Texture: Clay or silty clay
Clay content: 40 to 55 percent
Secondary carbonate: 0 to 10 percent, concretions, films, masses, or threads
Effervescence: None or slight
Reaction: Slightly alkaline or moderately alkaline

Lower Bk horizon

Hue: 10YR
Value: 5 to 7
Chroma: 1 to 3
Texture: Clay loam, silty clay loam, clay, or silty clay
Clay content: 35 to 45 percent
Secondary carbonate: 0 to 10 percent, concretions, films, masses, or threads
Effervescence: None to strong
Reaction: Slightly alkaline or moderately alkaline

BCk horizon (where present)

Hue: 10YR or 2.5Y
Value: 3 to 7
Chroma: 1 to 4
Texture: Clay loam, silty clay loam, silty clay, or clay
Clay content: 35 to 45 percent
Secondary carbonate: 0 to 10 percent, concretions, films, masses, or threads
Effervescence: Slight to strong
Reaction: Slightly alkaline or moderately alkaline

2Cr horizon

Hue: 7.5YR to 2.5Y
Value: 6 to 8
Chroma: 1 to 4
Texture: Noncalcareous weakly cemented siltstone bedrock of loam or silt loam texture interbedded with thin layers of calcium carbonate. This material slakes in water.
Clay content: 18 to 27 percent

Secondary carbonate: 0 to 5 percent, concretions or masses and are mostly in the upper part, fine

Effervescence: Matrix is noncalcareous; slight to strong in vicinity of carbonates

Reaction: Slightly alkaline or moderately alkaline

Esseville Series

Depth class: Moderately deep to densic bedrock

Drainage class: Well drained

Permeability class of the most limiting soil layer: 0.001 to 0.06 in/hr (very slow)

Landscape: Inland, dissected coastal plains

Landform: Interfluves, ridges

Parent material: Saline clayey marine deposits derived from mudstone and/or saline clayey fluviomarine deposits

Slope: 1 to 5 percent

Elevation: 180 to 500 feet

Mean annual precipitation: 22 to 28 inches

Mean annual air temperature: 70 to 73 degrees F

Frost-free period: 275 to 300 days

Taxonomic Class

Fine, smectitic, hyperthermic Sodic Gypsiusterts

Typical Pedon

Esseville clay (fig. 30) in an area of Esseville clay, 1 to 5 percent slopes; in shrub cover; Crowther, Texas USGS topographic quadrangle; Longitude: 28 degrees, 35 minutes, 8.52 seconds North; Longitude: 98 degrees, 26 minutes, 44.48 seconds West. UTM Easting: 554204 meters, UTM Northing: 3162212 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 10 inches; black (10YR 2/1) clay, black (10YR 2/1) moist; strong medium angular blocky structure; very sticky, very plastic; strong effervescence; non-saline; slightly alkaline; clear smooth boundary.

Bss—10 to 24 inches; black (10YR 2/1) clay, very dark gray (10YR 3/1) moist; strong coarse angular blocky structure; very sticky, very plastic; slickensides (pedogenic); 9 percent chert gravel; strong effervescence; very slightly saline; slightly alkaline; clear wavy boundary.

Bkssyz—24 to 30 inches; gray (10YR 5/1) clay, grayish brown (10YR 4/2) moist; strong coarse angular blocky parting to moderate medium angular blocky structure; very sticky, very plastic; slickensides (pedogenic); 3 percent fine irregular carbonate masses in matrix; 2 percent very fine salt masses; 2 percent fine gypsum crystals; strong effervescence; moderately saline; slightly alkaline; clear wavy boundary.

2BCkssyz—30 to 34 inches; pale olive (5Y 6/3) clay, pale olive (5Y 6/3) moist; moderate medium and coarse subangular blocky; very hard, very firm, moderately sticky, moderately plastic; 7 percent fine salt masses in matrix; 2 percent medium gypsum crystals; 5 percent very fine irregular carbonate masses in matrix; strong effervescence; moderately saline; moderately alkaline; clear wavy boundary.

2Cdyz—34 to 80 inches; pale olive (5Y 6/3) clay, pale olive (5Y 6/3) moist; noncemented bedrock mudstone bedrock that has a gypsiferous clay texture; massive; 15 percent fine salt masses in matrix; 7 percent medium gypsum crystals; slight effervescence; moderately saline; slightly alkaline.

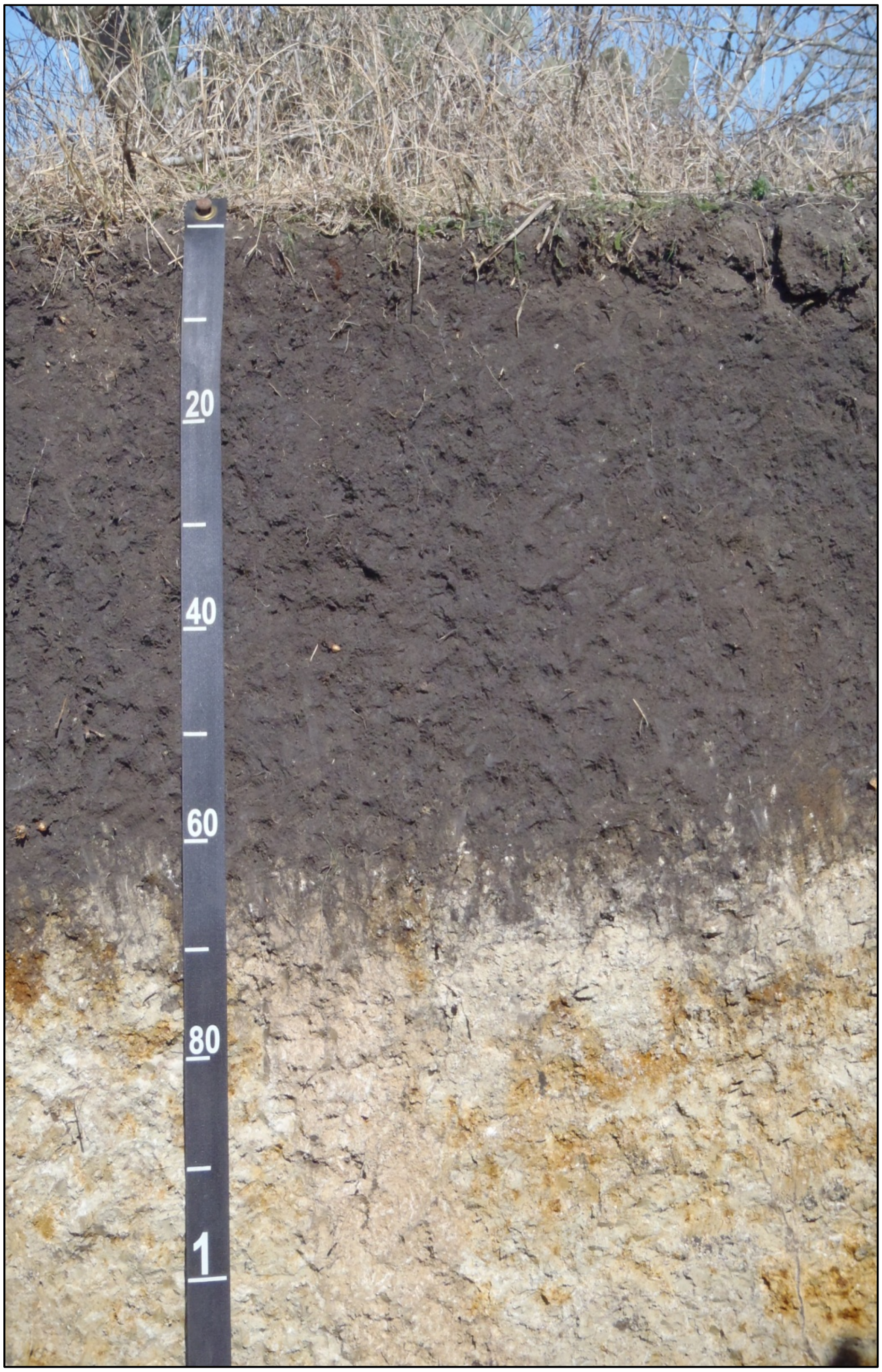

Figure 30.—Profile of Esseville clay, 1 to 5 percent slopes, in rangeland. Esseville soils have an abrupt contact of two parent materials occurring at 30 inches (76 cm). The subsoil is high in gypsum rich clay, and other visible salts. (Scale in cm-centimeters)

Range in Characteristics

Soil moisture: A typic ustic moisture regime. The soil moisture control section is dry in some or all parts for more than 90 but less than 180 cumulative days in normal years. June through August and December through February are the driest months. These soils are intermittently moist in September through November and March through May.
Solum thickness: 20 to 40 inches over noncemented claystone bedrock with texture of clay
Depth to densic material/densic contact: 20 to 40 inches
Depth to gypsic horizon: 12 to 35 inches
Calcium carbonate equivalent: 2 to 15 percent throughout the solum
Vertic features: Maximum thickness is in the microlows. The soil cracks 1/4 inch to 2 inches wide at the surface when dry. Undisturbed areas have gilgai microrelief with microhighs 4 to 10 inches higher than microlows. Distance from the center of the microhigh to the center of the microlow is 3 to 8 feet. Gilgai are linear in pattern in some pedons on slopes of 2 to 5 percent.
Particle-size control section (weighted average):
  Clay content: 45 to 60 percent

A horizon

Hue: 10YR
Value: 2 to 4
Chroma: 1 to 3
Texture: Clay or gravelly clay
Clay content: 40 to 55
Rock fragments: 0 to 30 percent by volume, siliceous pebbles and cobbles in the upper 15 inches
EC (dS/m): 0 to 4
Effervescence: Slight to strong
Reaction: Neutral to moderately alkaline

Bss horizon

Hue: 10YR
Value: 2 to 5
Chroma: 1 to 4
Texture: Clay or gravelly clay
Clay content: 40 to 60
Rock fragments: 0 to 10 percent, chert gravel
Secondary carbonate: 0 to 10 percent, fine and medium, masses and threads
EC (dS/m): 3 to 16
SAR: 2 to 25
Effervescence: Slightly and strongly
Reaction: Neutral to moderately alkaline

Bkssyz horizon

Hue: 10YR
Value: 2 to 5
Chroma: 1 to 3
Texture: Clay
Clay content: 40 to 60
Secondary carbonate: 5 to 20 percent, fine and medium, masses and threads
Gypsum: 5 to 20 percent
EC (dS/m): 4 to 16
SAR: 5 to 25
Effervescence: Strongly
Reaction: Neutral to moderately alkaline

2BCkssyz horizon

Hue: 2.5YR to 5Y
Value: 4 to 7
Chroma: 2 to 4
Texture: Clay or silty clay
Clay content: 55 to 80 percent
Secondary carbonate: 0 to 20 percent, fine and medium irregular masses and threads
Gypsum: 5 to 20 percent
EC (dS/m): 8 to 16
SAR: 15 to 25
Effervescence: Strong and violent
Reaction: Neutral to moderately alkaline

2Cdyz horizon

Hue: 5YR to 5Y
Value: 4 to 7
Chroma: 2 to 4
Texture: Gypsiferous clay, clay, or silty clay
Clay content: 55 to 80 percent
Secondary carbonate: 0 to 2 percent, fine, threads on surface of fractures
Gypsum: 0 to 5 percent
EC (dS/m): 8 to 16
SAR: 15 to 25
Effervescence: Strongly to violent
Reaction: Neutral to moderately alkaline

Fashing Series

Depth class: Shallow to densic bedrock
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.06 to 0.2 in/hr (slow)
Landscape: Inland, dissected coastal plains
Landform: Interfluves, ridges
Parent material: Clayey alluvium over siltstone
Slope: 1 to 5 percent
Elevation: 210 to 470 feet
Mean annual precipitation: 25 to 32 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 280 to 295 days

Taxonomic Class

Clayey, smectitic, hyperthermic, shallow Entic Haplustolls

Typical Pedon

Fashing clay in an area of Fashing clay, 1 to 5 percent slopes; in shrub cover; Tilden, Texas USGS topographic quadrangle; Longitude: 28 degrees, 27 minutes, 16.56 seconds North; Longitude: 98 degrees, 31 minutes, 27.77 seconds West. UTM Easting: 546567 meters, UTM Northing: 3147655 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A1—0 to 7 inches; very dark grayish brown (10YR 3/2) clay, very dark brown (10YR 2/2) moist; moderate fine subangular blocky structure; firm, hard, very sticky, very plastic; fine roots; 5 percent channers; slight effervescence; moderately alkaline; clear smooth boundary.

A2—7 to 12 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; firm, hard, very sticky, very plastic; fine roots; 2 percent channers; strong effervescence; moderately alkaline; abrupt smooth boundary.

2Cdyz—12 to 80 inches; light greenish gray (5Y 7/1) noncemented mudstone with clay texture, greenish gray (5Y 6/1) moist; massive; 5 percent fine prominent irregular white (10YR 8/1) dry, gypsum masses with sharp boundaries around rock fragments; 95 percent channers; slight effervescence; moderately alkaline.

Range in Characteristics

Soil moisture: A typic ustic moisture regime. The soil moisture control section is dry in some or all parts for more than 90 but less than 180 cumulative days in normal years. June through August and December through February are the driest months. These soils are intermittently moist in September through November and March through May.

Solum thickness: 10 to 20 inches, and the range in thickness is common within horizontal distances of less than 20 feet

A horizon

Hue: 10YR
Value: 3 to 5
Chroma: 1 to 3
Texture: Clay loam or clay
Fragments: 0 to 5 percent, chert gravels
COLE: exceeds 0.07
EC (dS/m): 0 to 4
Effervescence: None or slight
Reaction: Slightly alkaline or moderately alkaline

BC horizon (where present)

Hue: 10YR
Value: 3 to 7
Chroma: 1 to 3
Texture: Clay loam or clay
Clay content: 35 to 50 percent
Fragments: 0 to 5 percent, chert gravels
EC (dS/m): 0 to 4
COLE: exceeds 0.07
Effervescence: Slight to strong
Reaction: Slightly alkaline or moderately alkaline

2Cdyz horizon

Hue: 10YR to 5Y
Value: 5 to 8
Chroma: 1 to 3
Texture: Interbedded claystone, mudstone, and sandstone bedrock with clay texture
Secondary carbonates: Thin stratum of calcium carbonate occur in some pedons
Effervescence: Slight to strong
Reaction: Slightly alkaline or moderately alkaline

Floresville Series

Depth class: Very deep
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.06 to 0.2 in/hr (slow)

Landscape: Inland, dissected coastal plains
Landform: Stream terraces
Parent material: Loamy alluvium over clayey residuum weathered from sandstone
Slope: 0 to 3 percent
Elevation: 200 to 500 feet
Mean annual precipitation: 26 to 32 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 275 to 300 days

Taxonomic Class

Fine, mixed, active, hyperthermic Typic Paleustalfs

Typical Pedon

Floresville fine sandy loam in an area of Floresville fine sandy loam, 0 to 3 percent slopes; in shrub cover; Cross, Texas USGS topographic quadrangle; Longitude: 28 degrees, 35 minutes, 55.66 seconds North; Longitude: 98 degrees, 31 minutes, 24.17 seconds West. UTM Easting: 546601 meters, UTM Northing: 3163630 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 5 inches; brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; friable, slightly hard, nonsticky, nonplastic; neutral; gradual wavy boundary.

BA—5 to 11 inches; brown (7.5YR 4/3) fine sandy loam, brown (7.5YR 4/2) moist; moderate medium angular blocky structure; firm, slightly hard, nonsticky, nonplastic; common very fine and common fine roots; neutral; abrupt smooth boundary.

Bt1—11 to 25 inches; brown (7.5YR 5/4) sandy clay, brown (7.5YR 4/4) moist; moderate medium angular blocky structure; extremely firm, very hard, slightly sticky, moderately plastic; 35 percent distinct clay films on all faces of peds; neutral; clear smooth boundary.

Bt2—25 to 31 inches; reddish brown (5YR 5/4) sandy clay, reddish brown (5YR 4/4) moist; moderate medium angular blocky structure; extremely firm, very hard, slightly sticky, moderately plastic; 25 percent distinct clay films on all faces of peds; neutral; gradual wavy boundary.

Btk—31 to 41 inches; reddish yellow (5YR 6/6) sandy clay loam, yellowish red (5YR 5/6) moist; moderate fine subangular blocky structure; very firm, hard, slightly sticky, moderately plastic; 25 percent distinct clay films on all faces of peds; 3 percent fine irregular very weakly cemented carbonate masses in matrix; strong effervescence; moderately alkaline; gradual wavy boundary.

BCk—41 to 80 inches; reddish yellow (5YR 6/6) sandy clay loam, yellowish red (5YR 5/6) moist; weak coarse subangular blocky structure; friable, hard, slightly sticky, slightly plastic; 2 percent fine reddish yellow (7.5YR 6/8) dry, relic masses of oxidized iron with sharp boundaries in matrix; 5 percent fine irregular very weakly cemented carbonate masses in matrix; 10 percent fine irregular very weakly cemented calcium carbonate masses in matrix; strong effervescence; moderately alkaline.

Range in Characteristics

Soil moisture: A typic-ustic soil moisture regime. The soil moisture control section is dry in some or all parts for more than 90 days in normal years. Late June through August are the driest months, while September through November are the wettest months.

Solum thickness: 60 to 80 inches
Depth to secondary carbonates: 28 to 40 inches
Rock fragments: 1 to 5 percent, channers and gravels

A horizon (BA where present)

Hue: 2.5YR to 10YR
Value: 3 to 5

Chroma: 3 to 6
Texture: Loamy fine sand, fine sandy loam, or loam
Effervescence: None
Reaction: Slightly acid or neutral

Bt horizon

Hues: 2.5YR to 7.5YR
Value: 4 or 5
Chroma: 4 or 6
Texture: Sandy clay or clay
Clay content: 35 to 50 percent
Effervescence: None
Reaction: Slightly acid to moderately alkaline

Btk or Bk horizon

Hue: 2.5YR to 7.5YR
Value: 5 or 6
Chroma: 6 or 8
Texture: Sandy clay loam or sandy clay
Clay content: 28 to 40
Secondary carbonates: 0 to 10 percent, threadlike, films, masses, and concretions
Effervescence: Slightly and strong
Reaction: Slightly alkaline or moderately alkaline

BCk horizon (where present)

Hues: 5YR to 10YR
Value: 4 to 6
Chroma: 5 to 8
Texture: Fine sandy loam, sandy clay loam, or clay loam
Clay content: 25 to 40
Secondary carbonates: 0 to 10 percent, threadlike, films, masses, and concretions
Rock fragments: 0 to 5 percent, channers, weakly cemented sandstone
Effervescence: Slight and strong
Reaction: Moderately alkaline

Hindes Series

Depth class: Very deep
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.2 to 0.6 in/hr (moderately slow)
Landscape: Inland, dissected coastal plains
Landform: Paleoterraces
Parent material: Gravelly and/or loamy alluvium
Slope: 1 to 5 percent
Elevation: 160 to 510 feet
Mean annual precipitation: 20 to 25 inches
Mean annual air temperature: 70 to 72 degrees F
Frost-free period: 240 to 280 days

Taxonomic Class

Clayey-skeletal, mixed, active, hyperthermic Aridic Argiustolls

Typical Pedon

Hindes very gravelly sandy clay loam in an area of Hindes very gravelly sandy clay loam, 1 to 5 percent slopes; in shrub cover; Pertle Creek, Texas USGS topographic quadrangle; Longitude: 28 degrees, 36 minutes, 50.06 seconds North; Longitude: 98 degrees, 37 minutes, 38.06 seconds West. UTM Easting: 536441 meters, UTM Northing: 3165268 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 4 inches; very dark gray (10YR 3/1) very gravelly sandy clay loam, black (10YR 2/1) moist; moderate fine subangular blocky structure; friable, hard; slightly sticky and slightly plastic; many fine roots; slightly acid; clear wavy boundary.

Bt—4 to 12 inches; very dark gray (10YR 3/1) very gravelly clay, black (10YR 2/1) moist; moderate fine angular blocky structure; firm, very hard; moderately sticky and moderately plastic; many fine roots; 15 percent distinct clay films on all faces of peds; neutral; abrupt wavy boundary.

Btk—12 to 26 inches; pale brown (10YR 6/3) very gravelly clay loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; friable, very hard; moderately sticky and slightly plastic; common fine roots; strong effervescence; slightly alkaline.

BCk—26 to 80 inches; pink (7.5YR 7/4) clay loam, brown (7.5YR 5/4) moist; weak fine subangular blocky structure; very hard, friable; upper 2 inches is weakly cemented with fractures less than 4 inches apart horizontally; contains few fine, distinct reddish brown, strong brown and yellowish red streaks and pockets of loamy to sandy material; 2 percent rounded gravels of chert; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil moisture: An aridic ustic moisture regime. The soil moisture control section is moist in some or all parts for less than 90 consecutive days in normal years. June to August and December to February are the driest months, while September to November and March to May are the wettest months.

Solum thickness: 60 inches to more than 80 inches
Depth to secondary calcium carbonate: 20 to 45 inches

A horizon

Hue: 5YR to 10YR
Value: 3 to 5
Chroma: 1 to 3
Texture: Loam, sandy clay loam, clay loam, and their gravelly to extremely gravelly counterparts
Rock fragments: 15 to 75 percent by volume, siliceous pebbles and cobbles
Reaction: Slightly acid to slightly alkaline

Bt or Btk horizon

Hue: 2.5YR to 10YR
Value: 3 or 4
Chroma: 1 to 4
Texture: Sandy clay loam, clay loam, clay, and their gravelly to extremely gravelly counterparts
Clay content: 35 to 55 percent
Rock fragments: 35 to 80 percent by volume, siliceous pebbles and cobbles
Secondary carbonates: Some pedons contain films and threads or masses of calcium carbonate in the lower Bt horizon.
Effervescence: Slight to violent
Reaction: Slightly acid to slightly alkaline

BCk horizon (where present)

Hue: 7.5YR or 10YR
Value: 6 to 8
Chroma: 1 to 4
Texture: Clay, clay loam, sandy clay loam, and its gravelly to extremely gravelly counterparts
Rock fragments: 35 to 80 percent by volume, siliceous pebbles and cobbles
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

2BCk or C horizons

Some pedons have 2BCk or C horizons that have seams of soft sandstone. Horizontal fractures in the upper part are less than 4 inches apart.

Houla Series

Depth class: Very deep
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.6 to 2.0 in/hr (moderate)
Landscape: Inland, dissected coastal plains
Landform: Erosion remnants, broad flats
Parent material: Residuum from calcareous, tuffaceous sandstone
Slope: 1 to 3 percent
Elevation: 300 to 700 feet
Mean annual precipitation: 22 to 27 inches
Mean annual air temperature: 72 to 73 degrees F
Frost-free period: 260 to 300 days

Taxonomic Class

Fine-loamy, mixed, superactive, hyperthermic Aridic Calciustolls

Typical Pedon

Houla clay loam in an area of Houla clay loam, 1 to 3 percent slopes; in shrub cover; La Chusa Hill, Texas USGS topographic quadrangle; Longitude: 28 degrees, 13 minutes, 32.77 seconds North; Longitude: 98 degrees, 28 minutes, 9.62 seconds West. UTM Easting: 552067 meters, UTM Northing: 3122327 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 7 inches; very dark grayish brown (10YR 3/2) clay loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure; friable, slightly hard; common very fine and common fine roots; slight effervescence; moderately alkaline; gradual smooth boundary.

Bk1—7 to 15 inches; dark brown (10YR 3/3) silty clay loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; friable, slightly hard, slightly sticky, slightly plastic; common very fine and common fine roots; 8 percent fine threadlike carbonate masses in matrix and 2 percent medium irregular carbonate masses; strong effervescence; moderately alkaline; clear smooth boundary.

Bk2—15 to 56 inches; very pale brown (10YR 7/3) silty clay loam, brown (10YR 5/3) moist; weak very fine subangular blocky structure; friable, slightly hard, slightly sticky, slightly plastic; common very fine and few fine roots; 10 percent fine threadlike carbonate masses in matrix and 5 percent medium irregular carbonate masses; strong effervescence; moderately alkaline; gradual wavy boundary.

BCk—56 to 58 inches; light gray (10YR 7/1) loam, light gray (10YR 7/2) moist; very fine subangular blocky structure; very friable, soft, slightly sticky, moderately plastic; few very fine roots; 5 percent fine threadlike carbonate masses in matrix and 15 percent medium irregular carbonate masses in matrix; violent effervescence; slightly alkaline; gradual wavy boundary.

Ck—58 to 80 inches; very pale brown (10YR 7/3) silt loam, light gray (10YR 7/2) moist; moderate coarse subangular blocky structure; very friable, soft, slightly sticky, slightly plastic; 10 percent fine threadlike carbonate masses in matrix and 25 percent medium irregular carbonate masses; violent effervescence; slightly alkaline.

Range in Characteristics

Soil moisture: An aridic ustic moisture regime. The soil moisture control section is moist in some or all parts for less than 90 consecutive days in normal years. June to August and December to February are the driest months, while September to November and March to May are the wettest months.

Particle-size control section (weighted average):
Clay content: 18 to 25 percent

A horizon

Hue: 10YR
Value: 3 to 5
Chroma: 1 to 3
Texture: Loam, sandy clay loam, clay loam, silty clay loam, or silty clay
Calcium carbonate equivalent: 2 to 15 percent
EC (dS/cm): 0 to 1
SAR: 0 to 1
Effervescence: Slight to strong
Reaction: Slightly alkaline or moderately alkaline

Bk horizon

Hue: 7.5YR or 10YR
Value: 3 to 8
Chroma: 2 to 4
Texture: Silt loam, loam, sandy clay loam, clay loam, silty clay loam, or silty clay
Calcium carbonate equivalent: 5 to 30 percent
Secondary carbonates: 5 to 25 percent, fine and medium, masses and nodules
EC (dS/cm): 0 to 1
SAR: 0 to 15
Effervescence: Slight to violent
Reaction: Slightly alkaline or moderately alkaline

BCk horizon

Hue: 7.5YR or 10YR
Value: 4 to 8
Chroma: 1 to 4
Texture: Clay loam, silty clay loam, fine sandy loam, or loam
Calcium carbonate equivalent: 5 to 30 percent
EC (dS/cm): 0 to 1
SAR: 0 to 1
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

Ck horizon

Hue: 7.5YR or 10YR
Value: 6 to 8
Chroma: 1 to 4

Texture: Silty clay loam, fine sandy loam, clay loam, loam, or silt loam
Calcium carbonate equivalent: 5 to 30 percent
EC (dS/cm): 0 to 1
SAR: 0 to 1
Effervescence: Slight to violent
Reaction: Slightly alkaline or moderately alkaline

Imogene Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability class of the most limiting soil layer: 0.001 to 0.06 in/hr (very slow)
Landscape: Inland, dissected coastal plains
Landform: Draws, low stream terraces
Parent material: Saline, loamy alluvium
Slope: 0 to 2 percent
Elevation: 200 to 700 feet
Mean annual precipitation: 24 to 32 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 200 to 300 days

Taxonomic Class

Fine-loamy, mixed, superactive, hyperthermic Mollic Natrustalfs

Typical Pedon

Imogene fine sandy loam in an area of Imogene fine sandy loam, 0 to 2 percent slopes, occasionally flooded; in shrub cover; Pertle Creek, Texas USGS topographic quadrangle; Longitude: 28 degrees, 35 minutes, 43.45 seconds North; Longitude: 98 degrees, 37 minutes, 39.80 seconds West. UTM Easting: 536400 meters, UTM Northing: 3163218 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 4 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine subangular blocky structure; loose, soft, nonsticky, nonplastic; many fine roots; slightly acid; non-saline; abrupt smooth boundary.
Btn—4 to 13 inches; very dark gray (10YR 3/1) sandy clay loam, black (10YR 2/1) moist; moderate medium subangular blocky structure; firm, moderately hard, moderately sticky, moderately plastic; many fine roots; 20 percent clay films on all faces of peds; slightly alkaline; very slightly saline; clear wavy boundary.
Bknz—13 to 53 inches; brown (10YR 5/3) sandy clay loam, brown (10YR 4/3) moist; coarse subangular blocky structure; loose, slightly hard, slightly sticky, slightly plastic; 5 percent carbonate masses; 5 percent salt masses; strong effervescence; moderately alkaline; moderately saline; gradual wavy boundary.
Bnz—53 to 80 inches; light brownish gray (2.5Y 6/2) sandy clay loam, grayish brown (2.5Y 5/2) moist; coarse subangular blocky structure; loose, soft, slightly sticky, slightly plastic; 5 percent salt masses; slight effervescence; neutral; moderately saline.

Range in Characteristics

Soil moisture: A typic ustic moisture regime. The soil moisture control section is dry in some or all parts for more than 90 days but less than 180 cumulative days in normal years. June through August and December through February are the driest months. These soils are intermittently moist in September through November and March through May.
Particle-size control section (weighted average):
  Clay content: 20 to 35 percent

CEC to clay ratio: 0.6 to 0.70
SAR: 13 to 40

A horizon

Hue: 10YR
Value: 3 to 5
Chroma: 1 to 4
Texture: Fine sandy loam, very fine sandy loam, or loam
Clay content: 8 to 18 percent
EC (dS/m): 0 to 4
SAR: 2 to 18
Reaction: Slightly acid to slightly alkaline

Btn horizon

Hue: 7.5YR, 10YR, or 2.5Y
Value: 3 to 5
Chroma: 1 to 4
Texture: Loam, sandy clay loam, or clay loam
Clay content: 20 to 35 percent
EC (dS/m): 2 to 6
SAR: 13 to 40
Effervescence: Very slight to strong
Reaction: Neutral to moderately alkaline

Bkn horizon

Hue: 10YR, or 2.5Y
Value: 5 to 8
Chroma: 2 to 4
Texture: Loam, sandy clay loam, clay loam, or sandy clay
Clay content: 20 to 40 percent
Calcium carbonate equivalent: 0 to 30 percent
Secondary carbonates: Few to many, masses, threads, or nodules
EC (dS/m): 2 to 20
SAR: 25 to more than 40
Effervescence: Very slight to strong
Reaction: Neutral to strongly alkaline

Bnz or Bknz horizon

Hue: 10YR to 5Y
Value: 4 to 7
Chroma: 1 to 3
Texture: Sandy clay loam or clay loam
Clay content: 20 to 35 percent
Calcium carbonate equivalent: 0 to 5 percent
Secondary carbonates: None to common, masses, threads, or nodules
EC (dS/m): 4 to 16
SAR: 20 to 40
Effervescence: None to strong
Reaction: Neutral to strongly alkaline

BCnz or BC horizons (where present)

Hue: 10YR to 2.5Y
Value: 5 to 7
Chroma: 1 to 3

Texture: Sandy clay loam or clay loam
Clay content: 20 to 35 percent
Calcium carbonate equivalent: 0 to 5 percent
Secondary carbonates: Few to many, masses, threads, or nodules
EC (dS/m): 2 to 16
SAR: 10 to 40
Effervescence: Very slight to strong
Reaction: Neutral to strongly alkaline

Laparita Series

Depth class: Very deep
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.001 to 0.06 in/hr (very slow)
Landscape: Inland, dissected coastal plains
Landform: Broad interfluves
Parent material: Clayey residuum weathered from shale
Slope: 0 to 3 percent
Elevation: 170 to 600 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Taxonomic Class

Fine, smectitic, hyperthermic Pachic Vertic Argiustolls

Typical Pedon

Laparita clay loam in an area of Laparita clay loam, 0 to 3 percent slopes, rarely flooded; in shrub cover; Cross, Texas USGS topographic quadrangle; Longitude: 28 degrees, 30 minutes, 7.30 seconds North; Longitude: 98 degrees, 34 minutes, 55.67 seconds West. UTM Easting: 540894 meters, UTM Northing: 3152888 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 4 inches; dark gray (10YR 4/1) clay loam, very dark gray (10YR 3/1) moist; moderate medium subangular blocky structure; very firm, hard; many fine roots; common fine interstitial pores; slight effervescence; slightly alkaline; clear smooth boundary.

Bt—4 to 20 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; moderate medium prismatic structure parting to moderate medium angular blocky; firm, moderately hard; common fine roots; common very fine tubular pores; 3 percent clay films; slight effervescence; moderately alkaline; gradual smooth boundary.

Btk—20 to 31 inches; light brownish gray (10YR 6/2) clay loam, grayish brown (10YR 5/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; firm, moderately hard; common fine roots; common very fine interstitial pores; 4 percent fine carbonate masses; strong effervescence; moderately alkaline; gradual wavy boundary.

Bkyz—31 to 43 inches; very pale brown (10YR 7/3) clay loam, pale brown (10YR 6/3) moist; moderate medium subangular blocky structure; firm, moderately hard; common very fine roots; 6 percent fine carbonate masses; 4 percent fine salt masses; 2 percent fine gypsum crystals; strong effervescence; moderately alkaline; gradual smooth boundary

BCkyz—43 to 60 inches; light yellowish brown (2.5Y 6/3) clay loam, light olive brown (2.5Y 5/3) moist; moderate medium prismatic structure parting to moderate medium angular blocky; firm, moderately hard; 14 percent fine salt masses; 3 percent fine gypsum crystals; 12 percent medium carbonate masses; strong effervescence; moderately alkaline; gradual wavy boundary.

2Ckyz—60 to 80 inches; pale yellow (5Y 7/4) clay, pale olive (5Y 6/4) moist; moderate medium angular blocky structure; firm, moderately hard; 7 percent fine gypsum crystals; 8 percent fine salt masses; 1 percent fine carbonate masses; strong effervescence; moderately alkaline.

Range in Characteristics

Soil moisture: A typic ustic moisture regime. The soil moisture control section is dry in some or all parts for more than 90 days but less than 180 cumulative days in normal years. June through August and December through February are the driest months. These soils are intermittently moist in September through November and March through May.

Solum thickness: 40 to 60 inches
Depth to argillic horizon: 4 to 46 inches
Depth to secondary calcium carbonate: More than 14 inches
Particle-size control section (weighted average):
  Clay content: 35 to 60 percent

A horizon

Hue: 10YR
Value: 2 to 4 dry
Chroma: 1 to 2 dry
Texture: Loam, sandy clay loam, or clay loam
EC (dS/m): Less than 2
Effervescence: None to slight
Reaction: Slightly acid to slightly alkaline

Bt and Btk horizons

Hue: 10YR
Value: 2 to 6
Chroma: 1 to 3
Texture: Clay loam, sandy clay, or clay
Secondary carbonates: 0 to 5 percent
EC (dS/m): 4 to 12
Effervescence: None to strong
Reaction: Neutral to moderately alkaline

Bkyz and BCkz horizon (where present)

Hue: 10YR or 2.5Y
Value: 5 to 8 dry
Chroma: 1 to 4 dry
Texture: Sandy clay loam, clay loam, or clay
EC (dS/m): 6 to 16
Secondary carbonates: 1 to 5
Salt accumulations: 1 to 5
Effervescence: None to strong
Reaction: Slightly and moderately alkaline

2Ckyz layer

Hue: 2.5Y or 5Y
Value: 5 to 7 dry
Chroma: 2 to 4 dry
Texture: Clay loam, clay, or silty clay

Effervescence: None to strong
Reaction: Slightly and moderately alkaline

Lasalle Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability class of the most limiting soil layer: 0.001 to 0.06 in/hr (very slow)
Landscape: Inland, dissected coastal plains
Landform: Interfluves
Parent material: Calcareous, sodic clayey alluvium derived from shale
Slope: 0 to 3 percent
Elevation: 250 to 750 feet
Mean annual precipitation: 19 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 260 to 300 days

Taxonomic Class

Fine, smectitic, hyperthermic Sodic Haplusterts

Typical Pedon

Lasalle clay in an area of Lasalle clay, 1 to 3 percent slopes; in shrub cover; Caiman Creek NE, Texas USGS topographic quadrangle; Longitude: 28 degrees, 14 minutes, 22.48 seconds North; Longitude: 99 degrees, 2 minutes, 47.66 seconds West. UTM Easting: 495431 meters, UTM Northing: 3123743 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 5 inches; brown (7.5YR 5/2) clay, brown (7.5YR 4/2) moist; moderate fine and medium angular blocky structure; very firm, very hard; common very fine and common fine roots; strong effervescence; moderately alkaline; slightly saline; clear smooth boundary.

ABnz—5 to 24 inches; brown (7.5YR 5/2) clay, brown (7.5YR 4/2) moist; moderate fine and medium angular blocky structure; very firm, extremely hard; common very fine roots and many fine roots; strong effervescence; moderately alkaline; strongly saline; gradual wavy boundary.

Bnssyz1—24 to 42 inches; brown (7.5YR 5/2) clay, reddish brown (5YR 5/3) moist; moderate fine and medium angular blocky structure; very firm, extremely hard; few very fine and common fine roots; 2 percent slickensides (pedogenic); 1 percent fine threadlike gypsum masses; 1 percent fine threadlike salt masses; strong effervescence; moderately alkaline; moderately saline; diffuse wavy boundary.

Bnssyz2—42 to 58 inches; light reddish brown (5YR 6/3) clay, reddish brown (5YR 5/3) moist; moderate fine and medium angular blocky structure; very firm, extremely hard; few very fine and few fine roots; 5 percent slickensides (pedogenic); 1 percent fine threadlike gypsum masses; 1 percent fine threadlike salt masses; 1 percent medium irregular gypsum crystal clusters; strong effervescence; moderately alkaline; moderately saline; diffuse wavy boundary.

BCnssyz—58 to 80 inches; reddish brown (5YR 5/3) clay, reddish brown (5YR 5/3) moist; weak fine and medium angular blocky structure; very firm, extremely hard; 1 percent slickensides (pedogenic); 1 percent fine threadlike gypsum masses; 1 percent fine irregular salt masses; 1 percent medium irregular gypsum crystal clusters; strong effervescence; moderately alkaline; moderately saline.

Range in Characteristics

Soil moisture: An aridic ustic moisture regime. The soil moisture control section is moist in some or all parts for less than 90 consecutive days in normal years. June to August and December to February are the driest months, while September to November and March to May are the wettest months.
Solum thickness: 60 to more than 80 inches
ESP: 15 or more in some part of the upper 30 inches

A horizon

Hue: 5YR to 10YR
Value: 4 to 6
Chroma: 2 to 4
Texture: Clay
Clay content: 40 to 60 percent
EC (dS/m): 0.5 to 4 (A horizon)
Effervescence: None to strong
Reaction: Slightly alkaline or moderately alkaline

ABnz horizon

Hue: 5YR to 10YR
Value: 4 to 6
Chroma: 2 to 4
Texture: Clay
Clay content: 40 to 60 percent
EC (dS/m): 4 to 20 (AB horizon)
Effervescence: Very slight to strong
Reaction: Slightly alkaline or moderately alkaline

Bnssyz and BCnssyz horizons

Hue: 5YR or 7.5YR
Value: 4 to 6
Chroma: 2 to 4
Texture: Clay
Clay content: 40 to 60 percent
B horizon streaks: Few to many, colors of the A and AB horizons
Salt accumulations: Few to many, threads and crystals
EC (dS/m): 4 to 16 increasing with depth
Effervescence: Slight to strong
Reaction: Slightly alkaline or moderately alkaline

C horizon (where present)

Texture: Clay, clay intermingled with noncemented claystone masses or claystone bedrock
Salt accumulations: Few to many salt crystals and threads
Other features: In some pedons, the soft shale is interbedded with sandstone bedrock; soft shale slakes in water

Leoncita Series

Depth class: Very deep
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.6 to 2.0 in/hr (moderate)
Landscape: Inland, dissected coastal plains

Landform: Plains
Parent material: Calcareous loamy alluvium
Slope: 0 to 5 percent
Elevation: 20 to 500 feet
Mean annual precipitation: 20 to 30 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 290 to 340 days

Taxonomic Class

Fine-loamy, mixed, superactive, hyperthermic Aridic Calciustolls

Typical Pedon

Leoncita fine sandy loam (fig. 31) in an area of Leoncita fine sandy loam, 1 to 3 percent slopes; in rangeland; Tilden, Texas USGS topographic quadrangle; Longitude: 28 degrees, 27 minutes, 41.92 seconds North; Longitude: 98 degrees, 37 minutes, 10.16 seconds West. UTM Easting: 537252 meters, UTM Northing: 3148402 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

Ap1—0 to 5 inches; very dark grayish brown (10YR 3/2) fine sandy loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; firm, slightly hard, nonsticky, nonplastic; 3 percent gravels in soil and on surface; noneffervescent; slightly alkaline; clear smooth boundary.

Ap2—5 to 11 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; firm, slightly hard, nonsticky, nonplastic; carbonate, finely disseminated; very slight effervescence; moderately alkaline; clear smooth boundary.

Bk1—11 to 16 inches; grayish brown (10YR 5/2) sandy clay loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; very firm, moderately hard, nonsticky and nonplastic; 3 percent fine threadlike carbonate masses in matrix; slight effervescence; moderately alkaline; gradual smooth boundary.

Bk2—16 to 41 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 5/3) moist; weak coarse subangular blocky structure; very firm, moderately hard, nonsticky and nonplastic; 5 percent fine threadlike carbonate masses in matrix; strong effervescence; moderately alkaline; gradual wavy boundary.

Bk3—41 to 63 inches; very pale brown (10YR 7/3) loam, pale brown (10YR 6/3) moist; weak coarse subangular blocky structure; firm, slightly hard, slightly sticky and slightly plastic; 15 percent medium irregular carbonate masses and 3 percent medium irregular carbonate nodules; violent effervescence; moderately alkaline; gradual smooth boundary.

Bk4—63 to 80 inches; very pale brown (10YR 7/3) sandy clay loam, pale brown (10YR 6/3) moist; weak coarse subangular blocky structure; firm, slightly hard, slightly sticky and slightly plastic; 5 percent medium irregular carbonate masses; violent effervescence; moderately alkaline.

Range in Characteristics

Soil moisture: An aridic ustic moisture regime. The soil moisture control section is moist in some or all parts for less than 90 consecutive days in normal years. June to August and December to February are the driest months, while September to November and March to May are the wettest months.

Depth to secondary calcium carbonate: 11 to 80 inches
Depth to calcic horizon: 11 to 63 inches
Particle-size control section (weighted average):
  Clay content: 18 to 30 percent

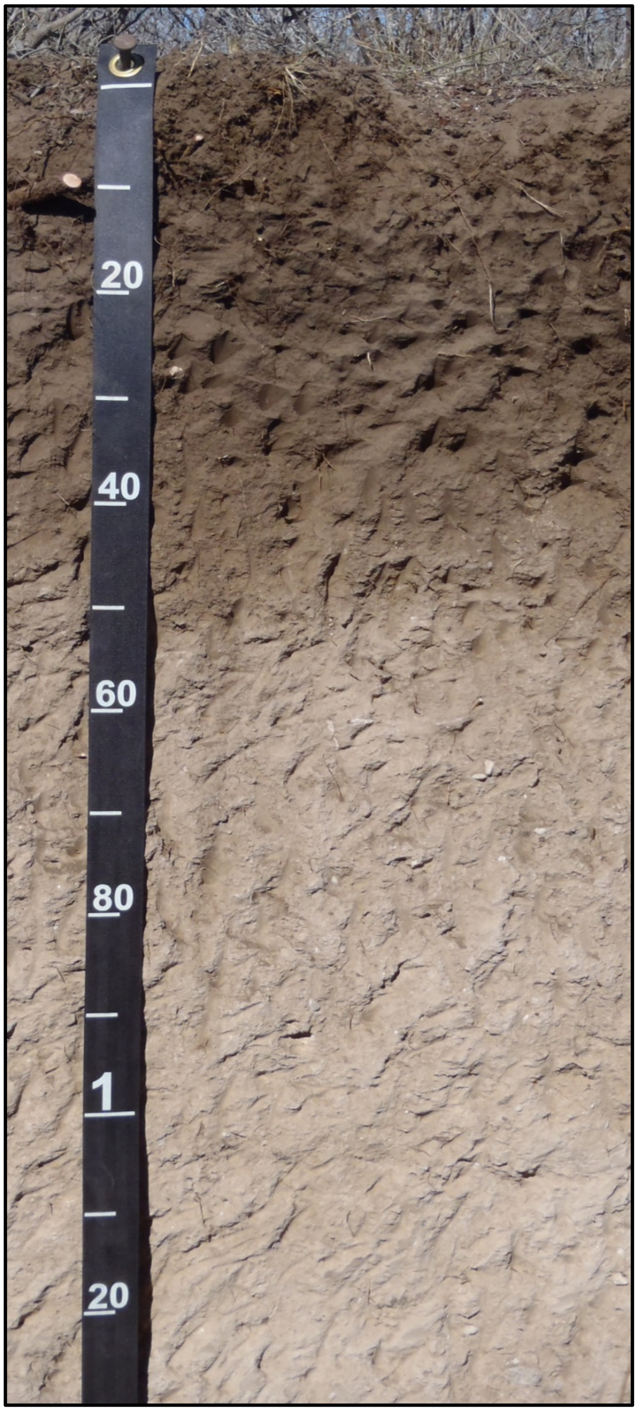

Figure 31.—Profile of Leoncita fine sandy loam, 1 to 3 percent slopes. Leoncita is a loamy soil that has no physical or chemical restrictions within 40 inches of the surface and is well suited to rangeland and pastureland. It is found on ancient terraces near the Frio and Nueces Rivers. (Scale in cm-centimeters)

A horizon

Hue: 10YR
Value: 3 to 5
Chroma: 1 to 3
Texture: Fine sandy loam or sandy clay loam
Clay content: 15 to 25 percent
Calcium carbonate equivalent: 0 to 5 percent
EC (dS/m): 0 to 1
SAR: 0 to 1
Effervescence: None to slight
Reaction: Slightly alkaline or moderately alkaline

Bk horizon

Hue: 10YR
Value: 3 to 8
Chroma: 1 to 4
Texture: Loam, sandy clay loam, or clay loam
Clay content: 18 to 32 percent
Rock fragments: 0 to 10 percent
Calcium carbonate equivalent: 10 to 25 percent
Secondary carbonates: 2 to 20 percent, fine medium and coarse, masses and nodules
EC (dS/m): 0 to 1
SAR: 0 to 2
Effervescence: Slight to violent
Reaction: Slightly alkaline or moderately alkaline

Lomart Series

Depth class: Moderately deep to paralithic bedrock
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.6 to 2.0 in/hr (moderate)
Landscape: Inland, dissected coastal plains
Landform: Erosion remnants
Parent material: Residuum from noncalcareous tuffaceous sandstone
Slope: 1 to 5 percent
Elevation: 250 to 700 feet
Mean annual precipitation: 22 to 27 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 260 to 300 days

Taxonomic Class

Coarse-loamy, mixed, superactive, hyperthermic Aridic Calciustepts

Typical Pedon

Lomart loam in an area of Lomart loam, 1 to 5 percent slopes; in shrub cover; Loma Alta NE, Texas USGS topographic quadrangle; Longitude: 28 degrees, 10 minutes, 31.86 seconds North; Longitude: 98 degrees, 31 minutes, 0.41 seconds West. UTM Easting: 547435 meters, UTM Northing: 3116740 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 8 inches; light brownish gray (10YR 6/2) loam, grayish brown (10YR 5/2) moist; moderate medium subangular blocky structure; friable, slightly hard, slightly sticky, slightly plastic; common very fine and fine roots; common fine interstitial and tubular pores; strong effervescence; moderately alkaline; clear smooth boundary.

Bk—8 to 24 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; friable, slightly hard, slightly sticky, slightly plastic; common very fine and fine roots; common very fine tubular pores; 2 percent irregular calcium carbonate masses in the matrix; strong effervescence; moderately alkaline; clear smooth boundary.

Cr—24 to 80 inches; pale yellow (5Y 7/4), weakly cemented tuffaceous sandstone, pale olive (5Y 6/4) moist; about 1 percent calcium carbonate coatings on pararock fragments and in fractures; noneffervescent; moderately alkaline.

Range in Characteristics

Soil moisture: An aridic ustic moisture regime. The soil moisture control section is moist in some or all parts for less than 90 consecutive days in normal years. June to August and December to February are the driest months, while September to November and March to May are the wettest months.

Depth to calcic horizon: Within 3 to 7 inches
Depth to paralithic contact: 21 to 40 inches
Particle-size control section (weighted average):
  Clay content: 6 to 12 percent
  Pararock fragments: 0 to 65 percent

A horizon

Hue: 10YR
Value: 5 to 7
Chroma: 2 to 4
Texture: Fine sandy loam, silt loam, or loam
Clay content: 8 to 15 percent
Pararock fragments: 0 to 10 percent
Calcium carbonate equivalent: 0 to 5 percent
Secondary carbonates: 0 to 1 percent, fine, nodules
EC (dS/m): 0 to 1
SAR: 0 to 1
Effervescence: Slight or strong
Reaction: Slightly alkaline or moderately alkaline

Upper Bk horizon

Hue: 10YR
Value: 5 to 8
Chroma: 2 to 4
Texture: Fine sandy loam, silt loam, loam or their paragravelly counterparts
Clay content: 6 to 12 percent
Pararock fragments: 0 to 35
Calcium carbonate equivalent: 10 to 15 percent
Secondary carbonates: 0 to 3 percent, fine, coatings, faces of pararock fragments
EC (dS/m): 0 to 1
SAR: 0 to 1
Effervescence: Slight to violent
Reaction: Slightly alkaline to strongly alkaline

Lower Bk horizon (where present)

Hue: 10YR or 2.5YR
Value: 6 to 8
Chroma: 2 to 4
Texture: Very fine sandy loam, silt loam, loam, and their very paracobbly and extremely paracobbly counterparts

Clay content: 6 to 12 percent
Pararock fragments: 15 to 65 percent
Calcium carbonate equivalent: 10 to 15 percent
Secondary carbonates: 0 to 3 percent, fine, coatings, faces of pararock fragments
EC (dS/m): 0 to 4
SAR: 0.5 to 4
Effervescence: Slight to violent
Reaction: Slightly alkaline to strongly alkaline

Cr layer

Hue: 2.5Y or 5Y
Value: 6 to 8
Chroma: 3 or 4
Paralithic materials: Weakly cemented to moderately cemented sandstone
Calcium carbonate equivalent: 0 to 5 percent
Secondary carbonates: 0 to 1 percent, coatings, on faces of pararock fragments and in fractures
Effervescence: None to slight
Reaction: Slightly alkaline or moderately alkaline

Mata Series

Depth class: Deep to densic bedrock
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.06 to 0.2 in/hr (slow)
Landscape: Inland, dissected coastal plains
Landform: Interfluves, ridges
Parent material: Gravelly loamy alluvium over shale
Slope: 1 to 8 percent
Elevation: 180 to 460 feet
Mean annual precipitation: 21 to 28 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 261 to 301 days

Taxonomic Class

Loamy-skeletal, mixed, superactive, hyperthermic Aridic Calciustepts

Typical Pedon

Mata very gravelly sandy clay loam in an area of Mata very gravelly sandy clay loam, 1 to 8 percent slopes; in shrub cover; Calliham NW, Texas USGS topographic quadrangle; Longitude: 28 degrees, 24 minutes, 39.72 seconds North; Longitude: 98 degrees, 24 minutes, 29.35 seconds West. UTM Easting: 557970 meters, UTM Northing; 3142878 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 14 inches; brown (10YR 5/3) very gravelly sandy clay loam, brown (10YR 4/3) moist; weak medium granular structure; friable, very hard, moderately sticky, nonplastic; common very fine and few fine roots; strong effervescence; moderately alkaline; non-saline; clear smooth boundary.

Bk—14 to 31 inches; white (10YR 8/1) very gravelly sandy clay loam, light gray (10YR 7/1) moist; weak medium subangular structure; firm, slightly hard, moderately sticky, nonplastic; few very fine roots; 60 percent distinct irregular carbonate masses with clear boundaries in matrix; violent effervescence; moderately alkaline; slightly saline; gradual wavy boundary.

Bkz—31 to 43 inches; white (10YR 8/1) gravelly sandy clay loam, light gray (10YR 7/1) moist; weak coarse subangular blocky structure; firm, slightly hard, moderately sticky, moderately plastic; few very fine roots; 70 percent prominent irregular carbonate masses with clear boundaries in matrix; 5 percent distinct salt masses in matrix; violent effervescence; moderately alkaline; moderately saline; gradual wavy boundary.

2Ckdyz—43 to 57 inches; gray (2.5Y 6/1) densic material that has a clay loam texture, gray (2.5Y 5/1) moist; massive; firm, slightly hard, moderately sticky, moderately plastic; 30 percent faint irregular carbonate masses in matrix; 5 percent distinct irregular salt masses in matrix; strong effervescence; moderately alkaline; moderately saline; gradual irregular boundary.

2Cdyz—57 to 80 inches; gray (2.5Y 6/1) densic material that has clay texture, gray (2.5Y 6/1) moist; massive; friable, rigid, moderately sticky, moderately plastic; strong effervescence; moderately alkaline; moderately saline.

Range in Characteristics

Soil moisture: An aridic ustic moisture regime. The soil moisture control section is moist in some or all parts for less than 90 consecutive days in normal years. June to August and December to February are the driest months, while September to November and March to May are the wettest months.

Depth to paralithic contact: 40 to 60 inches
Depth to calcic horizon: 5 to 40 inches
Particle-size control section (weighted average):
 Silicate clay content: 20 to 40 percent
 Rock fragments: 35 to 60 percent
CEC to clay ratio: 0.60 to 0.90

A horizon

Hue: 7.5YR or 10YR
Value: 4 to 7
Chroma: 2 to 4
Texture: Sandy clay loam, clay loam, or their gravelly counterparts
Clay content: 18 to 35 percent
Rock fragments: 5 to 35 percent
Calcium carbonate equivalent: 3 to 20 percent
Secondary carbonates: None to few, very fine and fine, films and threads
EC (dS/m): 0.4 to 1.0
Gypsum: 0 to 1 percent
SAR: 0 to 12
Effervescence: Slight or strong
Reaction: Slightly alkaline or moderately alkaline

Bk and Bkz horizons

Hue: 7.5YR to 2.5Y
Value: 5 to 8
Chroma: 1 to 4
Texture: Fine sandy loam, sandy loam, loam, sandy clay loam, or clay loam
Total c*lay content:* 20 to 40 percent
Silicate clay content: 20 to 35 percent
Rock fragments: 35 to 60 percent
Calcium carbonate equivalent: 5 to 40 percent
Secondary carbonates: Few to many, fine to coarse, films, threads, masses, and concretions
EC (dS/m): Upper part—0.4 to 6.0; lower part—4.0 to 16.0

Gypsum: 0 to 1 percent
SAR: Upper part—0 to 12; lower part—0 to 20
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

2Ckdyz (where present) and 2Cdyz layer

Hue: 5YR to 2.5Y
Value: 5 to 8
Chroma: 1 to 5
Texture: Silty clay, silty clay loam, clay loam, or clay
Secondary carbonates: 0 to 25 percent, fine to coarse, films, threads, masses, and concretions
Gypsum: 1 to 10 percent
Effervescence: Slight to violent
Reaction: Slightly alkaline or moderately alkaline

Maverick Series

Depth class: Moderately deep to densic bedrock
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.001 to 0.06 in/hr (very slow)
Landscape: Inland, dissected coastal plains
Landform: Interfluves, ridges
Parent material: Calcareous, saline, clayey residuum weathered from shale
Slope: 1 to 5 percent
Elevation: 200 to 570 feet
Mean annual precipitation: 21 to 28 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 261 to 301 days

Taxonomic Class

Fine, smectitic, hyperthermic Aridic Haplustepts

Typical Pedon

Maverick clay in an area of Maverick clay, 2 to 5 percent slopes; in shrub cover; Pertle Creek, Texas USGS topographic quadrangle; Longitude: 28 degrees, 31 minutes, 0.79 seconds North; Longitude: 98 degrees, 43 minutes, 30.21 seconds West. UTM Easting: 526903 meters, UTM Northing: 3154494 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 8 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; strong medium subangular blocky structure; very hard, firm; many fine roots; slightly effervescent; slightly saline; moderately alkaline; clear wavy boundary.
Bw—8 to 15 inches; pale brown (10YR 6/3) clay, brown (10YR 5/3) moist; moderate medium angular blocky structure; very hard, very firm, very sticky and very plastic; common fine roots; strong effervescence; moderately alkaline; clear wavy boundary.
Bknyz1—15 to 24 inches; pale brown (10YR 6/3) clay, pale brown (10YR 6/3) moist; moderate medium angular blocky structure; very hard, very firm. Very sticky and very plastic; 25 percent salt masses; 1 percent gravel; strong effervescence; moderately saline; moderately alkaline; abrupt wavy boundary.
Bknyz2—24 to 33 inches; pale yellow (2.5Y 7/3) clay, light yellowish brown (2.5Y 6/3) moist; moderate medium angular blocky structure; very hard, firm, very sticky and very plastic; 10 percent salt masses; 1 percent gypsum crystals; strong effervescence; moderately saline; moderately alkaline; clear wavy boundary.

BCknyz—33 to 38 inches; pale yellow (2.5Y 7/4) clay, light yellowish brown (2.5Y 6/3) moist; moderate medium angular blocky structure; very hard, firm, very sticky and very plastic; 5 percent salt masses; 1 percent gypsum crystals; strong effervescence; moderately saline; moderately; abrupt wavy boundary.

Cdyz1—38 to 60 inches; pale yellow (2.5Y 7/4) noncemented mudstone with clay texture, pale yellow (2.5Y 7/3) moist; massive; very hard, very firm; 5 percent prominent platy gypsum crystals along lamina or strata surfaces; strong effervescence; moderately saline; moderately alkaline; clear wavy boundary.

Cdyz2—60 to 80 inches; light olive brown (2.5Y 5/3) noncemented mudstone with clay texture, (2.5Y 5/3) moist; massive; 15 percent lithochromic mottles (5Y 7/2); 3 percent medium gypsum crystals; violently effervescence; moderately saline; moderately alkaline.

Range in Characteristics

Soil moisture: An aridic ustic moisture regime. The soil moisture control section is moist in some or all parts for less than 90 consecutive days in normal years. June to August and December to February are the driest months, while September to November and March to May are the wettest months.

Solum thickness: 20 to 40 inches to densic material (weathered mudstone bedrock)
Particle-size control section (weighted average):
- *Clay content:* 35 to 55 percent
- *Rock fragments:* 0 to 5 percent

CEC to clay ratio: 0.6 to 1.00

A horizon

Hue: 10YR to 2.5Y
Value: 4 to 6
Chroma: 2 to 4
Texture: Clay loam, silty clay, clay, or their gravelly or very gravelly counterparts
Clay content: 30 to 55 percent
Rock fragments: 0 to 50 percent
Calcium carbonate equivalent: 5 to 15 percent
EC (dS/m): 2 to 4
Gypsum: 0 to 2 percent
SAR: 13 to 20
Effervescence: Very slight or slight
Reaction: Slightly alkaline to strongly alkaline

Bw horizon

Hue: 10YR to 5Y
Value: 4 to 6
Chroma: 2 to 4
Texture: Clay loam, clay, or their gravelly or very gravelly counterparts
Clay content: 30 to 55 percent
Rock fragments: 0 to 50 percent
Calcium carbonate equivalent: 5 to 15 percent
EC (dS/m): 2 to 4
Gypsum: 0 to 2 percent
SAR: 13 to 20
Effervescence: Very slight to strong
Reaction: Slightly alkaline to strongly alkaline

Bkz and Bknyz horizons

Hue: 10YR to 5Y
Value: 5 to 7

Chroma: 2 to 6
Texture: Clay loam, silty clay loam, or clay
Clay content: 35 to 55 percent
Rock fragments: 0 to 10 percent
Pararock fragments: 0 to 5 percent
Calcium carbonate equivalent: 5 to 25 percent, averaging less than 15 percent. Where the percentage is greater than 15 percent, the horizon is less than 6 inches thick
Secondary carbonates: 1 to 20 percent, fine or medium, films, masses, threads on surfaces of peds and within peds
EC (dS/m): 4 to 16
Gypsum: 0 to 10 percent
SAR: 13 to 20
Effervescence: Strong or violent effervescence
Reaction: Slightly alkaline or moderately alkaline

BCknyz horizon

Hue: 10YR to 5Y
Value: 6 to 8
Chroma: 2 to 6
Texture: Clay loam, silty clay loam, or clay
Clay content: 30 to 55 percent
Lithochromic mottles: None to few, fine to medium, faint or distinct, with diffuse to sharp boundaries
Rock fragments: 0 to 15 percent
Pararock fragments: 0 to 5 percent
Calcium carbonate equivalent: 5 to 25 percent
Secondary carbonates: 1 to 20 percent, fine or medium, films, masses, threads on surfaces of peds and within peds
EC (dS/m): 4 to 16
Gypsum: 0 to 10 percent
SAR: 13 to 20
Effervescence: Strong or violent effervescence
Reaction: Slightly alkaline or moderately alkaline

Cdkyz layer

Hue: 10YR to 5Y
Value: 5 to 7
Chroma: 2 to 6
Texture: Clay loam or clay
Clay content: 35 to 55 percent
Cementation: Noncemented, weathered mudstone, or claystone densic bedrock. This material can be intermingled with weakly cemented sandstone.
Gypsum: 0 to 10 percent
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

Mirasol Series

Depth class: Very shallow to shallow to duripan
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.6 to 2.0 in/hr (moderate)
Landscape: Inland, dissected coastal plains
Landform: Cuestas, scarp slopes
Parent material: Loamy residuum weathered from tuff

Slope: 1 to 8 percent
Elevation: 250 to 750 feet
Mean annual precipitation: 23 to 25 inches
Mean annual air temperature: 72 to 73 degrees F
Frost-free period: 280 to 320 days

Taxonomic Class

Loamy-skeletal, mixed, superactive, hyperthermic, shallow Typic Durustepts

Typical Pedon

Mirasol gravelly sandy loam in an area of Mirasol gravelly sandy loam, 1 to 8 percent slopes; Freer NW, Texas USGS topographic quadrangle; Latitude: 27 degrees, 55 minutes, 58.0 seconds North; Longitude: 98 degrees, 42 minutes, 37.0 seconds West. UTM Easting: 528507 meters, UTM Northing: 3088617 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 6 inches; brown (10YR 5/3) gravelly sandy loam, brown (10YR 4/3) moist; weak fine granular and subangular blocky structure; hard, friable; slightly sticky and nonplastic; common fine and few medium roots; about 35 percent noncalcareous sandstone fragments ranging in size from 1 inch to 5 inches in diameter; noneffervescent; moderately alkaline; clear smooth boundary.

Bw—6 to 16 inches; yellowish brown (10YR 5/4) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; hard, friable, slightly sticky and nonplastic; common fine and few medium roots; about 45 percent noncalcareous sandstone fragments ranging in size from 1 inch to 5 inches in diameter; about 5 percent calcrete fragments less than 3 inches in diameter; slightly effervescent; moderately alkaline; abrupt smooth boundary.

Bkqm—16 to 19 inches; light yellowish brown (2.5Y 6/4) strongly cemented duripan, light olive brown (2.5Y 5/4) moist; massive; with plates 1/4 inch to 1 inch thick that have 2 percent coating of calcium carbonate; extremely hard, extremely firm; many fine and medium roots matted on top of laminar cap; laminar cap is 1/4 inch to 1/2 inch thick; many fine and very fine roots matted on top of laminar cap; violently effervescent along laminar cap; duripan material is noneffervescent; moderately alkaline; clear wavy boundary.

Bqm—19 to 80 inches; light yellowish brown (2.5Y 6/4) strongly cemented duripan, light olive brown (2.5Y 5/4) moist; massive; few fine and medium roots along cracks and fractures; noneffervescent; moderately alkaline.

Range in Characteristics

Soil moisture: An aridic ustic moisture regime. The soil moisture control section is moist in some or all parts for less than 90 consecutive days in normal years. June to August and December to February are the driest months, while September to November and March to May are the wettest months.

Particle-size control section (weighted average):
  Depth to duripan: 7 to 20 inches
  Rock fragments: 35 to 80 percent

A horizon

Hue: 7.5YR or 10YR
Value: 4 to 7
Chroma: 3 or 4
Texture: Gravelly sandy loam or very gravelly sandy loam
Clay content: 10 to 15 percent
Rock fragments: 15 to 40 percent
Calcium carbonate equivalent: 0 to 5 percent

EC (dS/m): 0 to 2
Gypsum: 0 to 2 percent
SAR: 0 to 2
Effervescence: None
Reaction: Slightly alkaline or moderately alkaline

Bw horizon

Hue: 10YR or 2.5Y
Value: 5 to 7
Chroma: 4 to 6
Texture: Gravelly or very gravelly sandy loam or sandy clay loam
Clay content: 15 to 25 percent
Rock fragments: 30 to 60 percent
Calcium carbonate equivalent: 15 to 25 percent
EC (dS/m): 0 to 4
Gypsum: 0 to 4 percent
SAR: 0 to 4
Effervescence: None to slight
Reaction: Slightly alkaline or moderately alkaline

Bkqm and Bqm horizons

Hue: 10YR or 2.5Y
Value: 5 to 7
Chroma: 4 to 7
Fragments; 0 to 65 percent, indurated chert gravels or cobbles
EC (dS/m): 0 to 8
Gypsum: 0 to 4 percent
SAR: 0 to 8
Effervescence: None to violent
Reaction: Slightly alkaline or moderately alkaline

Moglia Series

Depth class: Very deep
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.2 to 0.6 in/hr (moderately slow)
Landscape: Inland, dissected coastal plains
Landform: Interfluves
Parent material: Calcareous loamy residuum weathered from shale
Slope: 1 to 5 percent
Elevation: 130 to 680 feet
Mean annual precipitation: 22 to 27 inches
Mean annual air temperature: 72 to 73 degrees F
Frost-free period: 260 to 320 days

Taxonomic Class

Fine-loamy, mixed, active, hyperthermic Aridic Calciustepts

Typical Pedon

Moglia sandy clay loam in an area of Moglia sandy clay loam, 1 to 5 percent slopes; in shrub cover; Loma Alta NW, Texas USGS topographic quadrangle; Longitude: 28 degrees, 10 minutes, 8.90 seconds North; Longitude: 98 degrees, 39 minutes, 18.86 seconds West. UTM Easting: 533845 meters, UTM Northing: 3115987 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 6 inches; grayish brown (10YR 5/2) sandy clay loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; firm, hard, moderately sticky, moderately plastic; many fine roots and few medium roots; strong effervescence; non-saline; moderately alkaline; clear wavy boundary.

Bkz1—6 to 16 inches; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; firm, hard, moderately sticky, moderately plastic; common fine roots; 5 percent fine carbonate masses; 5 percent salt crystals; violent effervescence; very slightly saline; moderately alkaline; clear wavy boundary.

Bkz2—16 to 30 inches; very pale brown (10YR 7/3) clay loam, pale brown (10YR 6/3) moist; moderate medium subangular blocky structure; firm, hard, moderately sticky, moderately plastic; few fine roots; 10 percent carbonate masses; 5 percent salt crystals; violent effervescence; slightly saline; moderately alkaline; clear wavy boundary.

2Bknyz1—30 to 63 inches; very pale brown (10YR 7/3) loam, pale brown (10YR 6/3) moist; weak fine subangular blocky structure; friable, slightly hard, moderately sticky, moderately plastic; few fine roots; 10 percent carbonate masses; 10 percent gypsum masses; 10 percent salt crystals in matrix; violent effervescence; moderately saline; moderately alkaline; clear wavy boundary.

2Bknyz2—63 to 80 inches; light gray (10YR 7/2) loam, pale brown (10YR 6/3) moist; weak fine subangular blocky structure; friable, slightly hard, moderately sticky, moderately plastic; 10 percent carbonate masses; 10 percent gypsum masses; 10 percent salt masses; violent effervescence; strongly saline; moderately alkaline.

Range in Characteristics

Soil moisture: An aridic ustic moisture regime. The soil moisture control section is moist in some or all parts for less than 90 consecutive days in normal years. June to August and December to February are the driest months, while September to November and March to May are the wettest months.

Solum thickness: More than 80 inches

Depth to calcic horizon: 5 to 39 inches. The calcic horizon has a calcium carbonate equivalent of 5 to 15 percent more than the underlying material.

Depth to gypsic horizon: 40 to 80 inches

Particle-size control section (weighted average):

Rock fragments: 0 to 10 percent

Clay content: 25 to 45 percent

Silicate clay content: Ranges between 20 to 35 percent. The majority of pedons average between 27 and 35 percent silicate clay content.

CEC to clay ratio: 0.60 to 0.90

A horizon

Hue: 10YR or 2.5Y
Value: 5 or 6
Chroma: 2 to 4
Texture: Sandy clay loam or clay loam
Clay content: 20 to 40 percent
Silicate clay content: 20 to 35 percent
Rock fragments: 0 to 10 percent siliceous
Calcium carbonate equivalent: 2 to 10 percent
EC (dS/m): 0 to 2
Gypsum: 0 to 1 percent
SAR: 0 to 5
Effervescence: Very slight to strong
Reaction: Slightly alkaline or moderately alkaline

Bkz horizon

Hue: 7.5YR to 2.5Y
Value: 5 to 7
Chroma: 2 to 4
Texture: Clay loam or clay
Clay content: 30 to 45 percent
Silicate clay content: 25 to 35 percent
Rock fragments: 0 to 10 percent siliceous
Calcium carbonate equivalent: 5 to 25 percent
Secondary carbonates: 5 to 20 percent, fine and medium, films, threads, masses
EC (dS/m): 2 to 8. The EC decreases with depth in most pedons, but is more than 4 dS/m in all subsoil horizons below 25 inches.
Gypsum: 0 to 1 percent
SAR: 5 to 35; SAR increases with depth and is 15 to more than 30 in some horizon within 25 inches of the soil surface.
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

2Bknyz horizons

Hue: 7.5YR to 2.5Y
Value: 6 to 8
Chroma: 2 to 4
Texture: Loam, clay loam, clay, and the clay intermingled with weathered mudstone
Clay content: 15 to 30 percent in the 2B, 30 to 50 percent in the 3B
Rock fragments: 0 to 15 percent
Calcium carbonate equivalent: 2 to 25 percent
Secondary carbonates: 1 to 19 percent, fine to medium, films, threads, masses and concretions
EC (dS/m): 8 to 16
Gypsum: 0 to 20 percent; visible crystals of gypsum and other salts range from 0 to 25 percent by volume and occur at depths below 40 inches
SAR: 13 to 40
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

Montell Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability class of the most limiting soil layer: 0.001 to 0.06 in/hr (very slow)
Landscape: Inland, dissected plains
Landform: Circular gilgai on valley floors
Parent material: Clayey alluvium
Slope: 0 to 3 percent
Elevation: 190 to 470 feet
Mean annual precipitation: 23 to 26 inches
Mean annual air temperature: 70 to 72 degrees F
Frost-free period: 240 to 270 days

Taxonomic Class

Fine, smectitic, hyperthermic Sodic Haplusterts

Typical Pedon

Montell clay in an area of Montell clay, 0 to 3 percent slopes; in shrub cover; Rockaway Creek, Texas USGS topographic quadrangle; Longitude: 28 degrees, 29 minutes, 5.18 seconds North; Longitude: 98 degrees, 43 minutes, 2.54 seconds West. UTM Easting: 527663 meters, UTM Northing: 3150937 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A1—0 to 5 inches; gray (10YR 5/1) clay, dark gray (10YR 4/1) moist; moderate fine subangular blocky structure; firm, moderately hard, moderately sticky, moderately plastic; many very fine and common fine roots; strong effervescence; very slightly saline; moderately alkaline; clear smooth boundary.

A2—5 to 17 inches; gray (10YR 5/1) clay, dark gray (10YR 4/1) moist; strong medium angular blocky structure; very firm, hard, very sticky, very plastic; common very fine and fine roots; strong effervescence; very slightly saline; moderately alkaline; abrupt smooth boundary.

Bnss1—17 to 33 inches; dark gray (10YR 4/1) clay, dark grayish brown (10YR 4/2) moist; strong medium angular blocky structure, extremely firm, very hard, very sticky, very plastic; common very fine and fine roots; few distinct pressure faces on bottom faces of peds; slickensides (pedogenic); strong effervescence; slightly saline; moderately alkaline; clear wavy boundary.

Bnss2—33 to 39 inches; pale brown (10YR 6/3) clay, brown (10YR 5/3) moist; strong medium angular blocky structure, extremely firm, very hard, very sticky, very plastic; few very fine and fine roots; few distinct pressure faces on bottom faces of peds; few slickensides (pedogenic); 2 percent medium irregular salt masses in matrix; violent effervescence; slightly saline; moderately alkaline; clear wavy boundary.

Bkyz1—39 to 55 inches; light yellowish brown (2.5Y 6/3) clay, pale brown (10YR 6/3) moist; moderate fine subangular blocky structure; firm, moderately hard, very sticky, very plastic; few very fine and fine roots; 2 percent fine irregular carbonate masses in matrix; 1 percent gypsum crystals between peds; 3 percent medium irregular salt masses in matrix; violent effervescence; moderately saline; moderately alkaline; gradual wavy boundary.

Bkyz2—55 to 80 inches; light yellowish brown (2.5Y 6/3) clay, pale brown (10YR 6/3) moist; platy structure; firm, moderately hard; few very fine and fine roots; 3 percent fine irregular carbonate masses in matrix; 1 percent fine irregular (10YR 6/2) iron depletions in matrix; 3 percent cylindrical iron-manganese masses in matrix; 3 percent irregular salt masses; 1 percent gypsum crystals; strong effervescence; moderately saline; moderately alkaline.

Range in Characteristics

Soil moisture: An aridic ustic moisture regime. The soil moisture control section is moist in some or all parts for less than 90 consecutive days in normal years. June to August and December to February are the driest months, while September to November and March to May are the wettest months.

Solum thickness: More than 80 inches

Vertic features: When dry, cracks 1/4 inch to more than 2 inches wide at the surface extend to a depth of 12 inches or more. Cracks open 150 to 210 cumulative days during most years. Gilgai reliefs in undisturbed areas, have microknolls 5 to 12 feet in diameter and 3 to 12 inches higher than the microdepressions. Slickensides begin at a depth of 6 to 20 inches

Calcium carbonate equivalent: 10 to 40 percent

Reaction: Slightly alkaline or moderately alkaline

Particle-size control section (weighted average):

Clay content: 40 to 60 percent

Silicate clay: 35 to 50 percent

Texture: Silty clay or clay
ESP: 15 to more than 40 percent in some horizon within 40 inches of the soil surface

A horizon

Hue: 10YR or 2.5Y
Value: 4 to 6
Chroma: 1
Texture: Clay or clay loam
EC (dS/m): 0.4 to 4
Effervescence: Very slight to strong
Reaction: Moderately alkaline

Bnss horizon

Hue: 10YR or 2.5Y
Value: 4 to 6
Chroma: 1 to 3
Texture: Clay
EC (dS/m): 2 to 16
Effervescence: Slight to strong
Reaction: Moderately alkaline

Bkyz horizon

Hue: 10YR or 2.5Y
Value: 4 to 7
Chroma: 1 to 4
Relict redox features: In shades of red, brown, or gray in some pedons
Texture: Clay
Secondary carbonates: Gypsum
Other features: Crystalline salts, mainly gypsum, range from 5 to 35 percent.
EC (dS/m): 2 to 16
Effervescence: Strong or violent
Reaction: Moderately alkaline

Monwebb Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability class of the most limiting soil layer: 0.001 to 0.06 in/hr (very slow)
Landscape: Inland, dissected coastal plains
Landform: Valley flats
Parent material: Clayey alluvium
Slope: 0 to 1 percent
Elevation: 180 to 490 feet
Mean annual precipitation: 22 to 28 inches
Mean annual air temperature: 70 to 72 degrees F
Frost-free period: 270 to 300 days

Taxonomic Class

Fine, smectitic, hyperthermic Sodic Haplusterts

Typical Pedon

Monwebb clay in an area of Monwebb clay, 0 to 1 percent slopes, occasionally flooded; in shrub cover; Cross, Texas USGS topographic quadrangle; Longitude: 28 degrees, 33 minutes, 56.06 seconds North; Longitude: 98 degrees, 36 minutes, 29.27 seconds West.

UTM Easting: 538327 meters, UTM Northing: 3159919 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 15 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; strong coarse angular blocky structure; very hard, firm, very sticky, very plastic; many very fine and common medium roots; very few fine tubular pores; SAR is 1; strongly effervescent; non-saline; moderately alkaline; clear wavy boundary.

Bnss—15 to 40 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; strong medium angular blocky structure; very hard, firm, very sticky, very plastic; common very fine and common fine roots; few very fine tubular pores; 20 percent slickensides (pedogenic) on all faces of peds; SAR is 22; strongly effervescent; moderately saline; slightly alkaline; clear wavy boundary.

Bnssz1—40 to 73 inches; yellowish brown (10YR 5/4) clay, dark yellowish brown (10YR 4/4) moist; weak medium prismatic parting to moderate medium subangular blocky structure; very hard, very firm, very sticky, very plastic; few very fine roots; 10 percent slickensides (pedogenic) on all faces of peds; 5 percent salt masses in matrix; SAR is 31; strongly effervescent; moderately saline; moderately alkaline; gradual wavy boundary.

Bnssz2—73 to 80 inches; light yellowish brown (10YR 6/4) clay, yellowish brown (10YR 5/4) moist; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, very firm, very sticky, very plastic; few fine tubular pores; 5 percent slickensides (pedogenic) on all faces of peds; 1 percent rounded chert gravels; 2 percent very fine masses of salts; SAR is 29; slight effervescent; moderately saline; moderately alkaline.

Range in Characteristics

Soil moisture: An aridic ustic moisture regime. The soil moisture control section is moist in some or all parts for less than 90 consecutive days in normal years. June to August and December to February are the driest months, while September to November and March to May are the wettest months.

Particle-size control section (weighted average):
Clay content: 40 to 55 percent
Rock fragments: 0 to 5 percent

A or An horizon (where present)

Hue: 10YR
Value: 3 or 4
Chroma: 1 or 2
Texture: Clay loam or clay
Clay content: 35 to 50 percent
Rock fragments: 0 to 5 percent
Calcium carbonate equivalent: 0 to 15 percent
EC (dS/m): 0 to 8
Gypsum: 0 to 1 percent
SAR: 0 to 13
Effervescence: None to strong
Reaction: Slightly alkaline or moderately alkaline

Bnss horizon

Hue: 10YR
Value: 3 to 5
Chroma: 1 to 3
Texture: Clay loam or clay
Clay content: 35 to 55 percent
Rock fragments: 0 to 5 percent

Calcium carbonate equivalent: 0 to 15 percent
EC (dS/m): 8 to 20
Gypsum: 1 to 4 percent
SAR: 15 to 40
Effervescence: Slight or strong
Reaction: Slightly alkaline or moderately alkaline

Bnssz or Bknssz horizon (where present)

Hue: 10YR or 2.5Y
Value: 4 to 7
Chroma: 1 to 4
Texture: Clay loam or clay
Clay content: 35 to 55 percent
Rock fragments: 0 to 5 percent
Calcium carbonate equivalent: 0 to 15 percent
EC (dS/m): 8 to 20
Gypsum: 1 to 4 percent
SAR: 15 to 40
Effervescence: Slight to violent
Reaction: Slightly alkaline or moderately alkaline

Bknz horizon (where present)

Hue: 10YR or 2.5Y
Value: 4 to 7
Chroma: 1 to 3
Texture: Clay loam or clay
Clay content: 35 to 55 percent
Rock fragments: 0 to 5 percent
Calcium carbonate equivalent: 0 to 15 percent
EC (dS/m): 8 to 20
Gypsum: 2 to 5 percent
SAR: 15 to 40
Effervescence: Slight to violent
Reaction: Slightly alkaline or moderately alkaline

Nusil Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability class of the most limiting soil layer: 0.2 to 0.6 in/hr (moderately slow)
Landscape: River valleys
Landform: Stream terraces
Parent material: Loamy alluvium
Slope: 1 to 5 percent
Elevation: 80 to 450 feet
Mean annual precipitation: 24 to 34 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 270 to 290 days

Taxonomic Class

Loamy, siliceous, active, hyperthermic Arenic Paleustalfs

Typical Pedon

Nusil fine sand in an area of Rhymes-Nusil complex, 1 to 3 percent slopes; in shrub cover; La Chusa Hill, Texas USGS topographic quadrangle; Longitude: 28 degrees, 14 minutes, 15.13 seconds North; Longitude: 98 degrees, 24 minutes, 12.15 seconds West. UTM Easting: 558533 meters, UTM Northing: 3123660 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 9 inches; dark grayish brown (10YR 4/2) fine sand, very dark grayish brown (10YR 3/2) moist; single grain; loose, very friable; nonsticky, nonplastic; slightly acid; clear smooth boundary.

E—9 to 25 inches; pale brown (10YR 6/3) fine sand, yellowish brown (10YR 5/4) moist; single grained; loose, very friable, nonsticky, nonplastic; neutral; abrupt smooth boundary.

Bt1—25 to 33 inches; brown (10YR 4/3) sandy clay loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; hard, firm; nonsticky, nonplastic; 5 percent clay films between sand grains; neutral; gradual wavy boundary.

Bt2—33 to 43 inches; brown (7.5YR 5/4) sandy clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky, slightly plastic; 20 percent clay films on all faces of peds; neutral; clear wavy boundary.

Bt3—43 to 80 inches; brown (7.5YR 5/4) sandy clay loam, brown (7.5YR 4/4) moist; strong medium subangular blocky structure; hard, very firm, slightly sticky, slightly plastic; 30 percent clay films on all faces of peds; moderately alkaline.

Range in Characteristics

Soil moisture: A typic-ustic moisture regime. The soil moisture control section is dry in some or all parts for more than 90 days but less than 180 cumulative days in normal years. June through August and December through February are the driest months. These soils are intermittently moist in September through November and March through May.

Arenic feature: 0 to 33 inches
Particle-size control section (weighted average):
  Clay content: 18 to 35 percent

A horizon

Hue: 7.5YR or 10YR
Value: 4 to 6
Chroma: 2 to 4
Texture: Fine sand or loamy fine sand
Clay content: 3 to 10 percent
Reaction: Slightly acid to slightly alkaline

E horizon

Hue: 7.5YR or 10YR
Value: 5 to 7
Chroma: 2 to 4
Texture: Fine sand or loamy fine sand
Clay content: 3 to 10 percent
Redox concentrations: 0 to 10 percent, fine and medium, faint or distinct, sharp boundaries, in shades of yellow and brown
Reaction: Slightly acid to slightly alkaline

Bt or Btk horizons (where present)

Hue: 7.5YR or 10YR
Value: 4 to 7

Chroma: 2 to 6
Texture: Fine sandy loamy or sandy clay loam
Clay content: 18 to 35 percent
Redox concentrations: 2 to 25 percent, fine to coarse, distinct, sharp boundaries, in shades of red, yellow, or brown
Redox depletions: 0 to 2 percent, fine, sharp boundaries, in shades of gray
Iron-manganese concentrations: 0 to 5 percent, fine, masses
Secondary carbonates: 0 to 5 percent, fine, masses, throughout
Effervescence: None to strong
Reaction: Slightly acid to moderately alkaline

BC or BCk horizons (where present)

Hue: 7.5YR or 10YR
Value: 5 to 8
Chroma: 2 to 6
Texture: Fine sandy loam or sandy clay loam
Clay content: 15 to 30 percent
Redox concentrations: 0 to 15 percent, fine to coarse, distinct, sharp boundaries, in shades of red, yellow, or brown
Base saturation: 60 to 100 percent
Secondary carbonates: 0 to 10 percent, fine and medium, masses
Effervescence: None to strong
Reaction: Slightly acid to moderately alkaline

Olmedo Series

Depth class: Shallow to petrocalcic
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.6 to 2.0 in/hr (moderate)
Landscape: Inland, dissected coastal plains
Landform: Interfluves
Parent material: Calcareous loamy residuum of Miocene-Pliocene age
Slope: 1 to 8 percent
Elevation: 300 to 1,200 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Taxonomic Class

Loamy-skeletal, carbonatic, hyperthermic, shallow Petrocalcic Calciustolls

Typical Pedon

Olmedo very gravelly loam in an area of Olmedo very gravelly loam, 1 to 8 percent slopes; in rangeland; Rosita NE, Texas USGS topographic quadrangle; Longitude: 27 degrees, 57 minutes, 26.00 seconds North; Longitude: 98 degrees, 18 minutes, 38.00 seconds West longitude. UTM Easting: 567816 meters, UTM Northing: 3092655 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A1—0 to 6 inches; dark grayish brown (10YR 4/2) very gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; friable, soft, slightly sticky, slightly plastic; common fine, common medium, and common coarse roots; common very fine low continuity vesicular pores; 2 percent fine irregular weakly cemented shell fragments; 35 percent petrocalcic gravel; strong effervescence; moderately alkaline; clear smooth boundary.

A2—6 to 12 inches; dark grayish brown (10YR 4/2) very gravelly fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure parting to weak fine granular structure; friable, slightly hard, slightly sticky, slightly plastic; common fine, common medium, and common coarse roots; common very fine low continuity vesicular pores; 2 percent fine spherical moderately cemented carbonate nodules; 1 percent fine irregular moderately cemented shell fragments; 47 percent petrocalcic gravel; strong effervescence; moderately alkaline; abrupt smooth boundary.

Bkkm1—12 to 17 inches; white (10YR 8/1) cemented channers, white (10YR 8/1) moist; massive; indurated; common fine roots at top of horizon; violent effervescence; moderately alkaline; clear smooth boundary.

Bkkm2—17 to 38 inches; white (10YR 8/1) cemented gravel, white (10YR 8/1) moist; massive; very strongly cemented; violent effervescence; moderately alkaline; gradual wavy boundary.

BCk1—38 to 58 inches; white (10YR 8/1) weakly cemented caliche, white (10YR 8/1) moist; massive; moderately cemented; common very fine and fine continuity vesicular pores; violent effervescence; moderately alkaline; gradual wavy boundary.

BCk2—58 to 80 inches; white (10YR 8/1) weakly cemented caliche, white (10YR 8/1) moist; massive; weakly cemented; common very fine and fine low continuity vesicular pores; violent effervescence; moderately alkaline.

Range in Characteristics

Soil moisture: An aridic ustic moisture regime. The soil moisture control section is moist in some or all parts for less than 90 consecutive days in normal years. June to August and December to February are the driest months, while September to November and March to May are the wettest months.

Depth to petrocalcic horizon: 12 to 18 inches
Particle-size control section (weighted average):
  Clay content: 12 to 24 percent
  Rock fragments: 35 to 85 percent

A horizon

Hue: 7.5YR or 10YR
Value: 3 to 5
Chroma: 1 to 3
Texture: Fine sandy loam or loam
Clay content: 12 to 22 percent
Rock fragments: 35 to 85 percent
Calcium carbonate equivalent: 10 to 70 percent
EC (dS/m): 0 to 1
SAR: 0 to 1
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

Bkkm horizon

Hue: 10YR
Value: 8
Chroma: 1 or 2
Texture: Indurated calcium carbonate (petrocalcic)
Calcium carbonate equivalent: 40 to 80 percent
EC (dS/m): 0 to 1
SAR: 0 to 1
Effervescence: Violent
Reaction: Slightly alkaline or moderately alkaline

BCk or BCkk horizons

Hue: 7.5YR or 10YR
Value: 7 or 8
Chroma: 1 to 3
Texture: Very weakly and weakly cemented caliche with a texture of silt loam, loam, or there gravelly and very gravelly counterparts
Clay content: 4 to 12 percent
Rock fragments: 2 to 40 percent
Calcium carbonate equivalent: 40 to 75 percent
Secondary carbonates: 10 to 40 percent, fine and medium, masses
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

Pavelek Series

Depth class: Shallow to petrocalcic horizon
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.06 to 0.2 in/hr (slow)
Landscape: Inland, dissected coastal plains
Landform: Narrow, low ridges
Parent material: Clayey alluvium over weakly cemented siltstone
Slope: 3 to 5 percent
Elevation: 350 to 480 feet
Mean annual precipitation: 28 to 32 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 275 to 290 days

Taxonomic Class

Clayey, smectitic, hyperthermic, shallow Petrocalcic Calciustolls

Typical Pedon

Pavelek clay loam in an area of Pavelek clay loam, 3 to 5 percent slopes, severely eroded; in shrub cover; Comanche Hills, Texas USGS topographic quadrangle; Longitude: 28 degrees, 34 minutes, 18.00 seconds North; Longitude: 98 degrees, 9 minutes, 42.00 seconds West. UTM Easting: 581990 meters, UTM Northing: 3160818 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 4 inches; very dark gray (10YR 3/1) clay loam, black (10YR 2/1) moist; weak fine subangular blocky structure parting to moderate fine granular structure; firm, hard, very sticky, very plastic; many very fine and fine, and common medium roots; few snail shell fragments; common insect casts; few fine tubular pores; few small 1/8 inch diameter fragments of caliche (degraded petrocalcic); strong effervescence; moderately alkaline; clear wavy boundary.

Bk—4 to 11 inches; light brownish gray (10YR 6/2) clay, grayish brown (10YR 5/2) moist; weak fine granular structure parting to moderate fine subangular blocky structure; firm, very hard, very sticky, very plastic; common very fine and fine, and few medium roots; few snail shell fragments; common insect casts; common fine and few medium tubular pores; approximately 10 percent by volume irregular shaped caliche fragments of degraded petrocalcic less than 3/4 inch in diameter; violent effervescence; moderately alkaline; abrupt wavy boundary.

Bkkm—11 to 14 inches; white (10YR 8/1) strongly cemented caliche that is laminar in the upper part, very pale brown (10YR 8/2) moist; massive; many very fine and few and few medium roots matted on surface of petrocalcic with a few roots extending through cracks in petrocalcic; violent effervescence; moderately alkaline; gradual wavy boundary.

BCk—14 to 36 inches; pink (7.5YR 7/3) weakly consolidated siltstone, light brown (7.5YR 6/4) moist; massive; siltstone contains soft masses and coatings of calcium carbonate along vertical and horizontal fractures; few fine and medium roots between cracks; slight effervescence; moderately alkaline; gradual wavy boundary.

2Cr—36 to 80 inches; pink (7.5YR 7/3) weakly cemented siltstone bedrock of silt loam texture, light brown (7.5YR 6/4) moist; massive; siltstone contains coatings of calcium carbonate along vertical fracture seams; few fine roots between cracks; noneffervescent; moderately alkaline.

Range in Characteristics

Soil moisture: A typic ustic moisture regime. The soil moisture control section is dry in some or all parts for more than 90 days but less than 180 cumulative days in normal years. June through August and December through February are the driest months. These soils are intermittently moist in September through November and March through May.

Solum thickness and depth to a petrocalcic horizon: 10 to 20 inches
Particle-size control section (weighted average):
Clay content: 35 to 50 percent

A horizon

Hue: 10YR
Value: 2 to 4
Chroma: 1 or 2
Texture: Clay loam or clay
Rock fragments: 0 to 15 percent fine caliche fragments and calcium carbonate concretions
Effervescence: Slight or strong
Reaction: Slightly alkaline or moderately alkaline

Bk horizon

Hue: 10YR
Value: 3 to 6
Chroma: 1 or 2
Texture: Gravelly clay loam or gravelly clay
Rock fragments: 5 to 30 percent, caliche fragments
Effervescence: Slight or strong
Reaction: Slightly alkaline or moderately alkaline and calcareous

Bkkm horizon

Hue: 10YR or 2.5Y
Value: 6 to 8
Chroma: 1 to 3
Texture: Caliche
Cementation: Weakly to strongly cemented
Cemented caliche fragments: 1 to 8 inches across and 1/8 inch to 3 inches thick
Effervescence: Strong or violent
Reaction: Moderately alkaline

BCk or CBk horizon (where present)

Hue: 7.5YR to 2.5Y
Value: 7 or 8
Chroma: 1 to 3
Texture: Silt loam or loam
Cementation: Weakly consolidated caliche or calcareous siltstone; this layer slakes in water
Calcium carbonate equivalent: 20 to 50 percent

Secondary carbonates: 5 to 45 percent, fine to coarse, films, threads, and masses, 1/2 inch to 8 inches apart and decrease in the lower part
Calcium carbonate filled krotovinas: Few to many, fine and medium
Effervescence: Slight to violent
Reaction: Moderately alkaline

2Cr or 2Crk layer (where present)

Hue: 7.5YR to 2.5Y
Value: 6 to 8
Chroma: 1 to 4
Texture: Weakly cemented siltstone with texture of silt loam or loam
Kind: Fractured, noncalcareous, siltstone; this layer slakes in water
Secondary carbonates: Few, thin, films and threads in the upper part of the layer
Effervescence: None to very slight
Reaction: Moderately alkaline

Pernitas Series

Depth class: Very deep
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.6 to 2.0 in/hr (moderate)
Landscape: Inland, dissected coastal plains, low hills
Landform: Paleoterraces, ridges
Parent material: Loamy colluvium loamy residuum, loamy alluvium
Slope: 1 to 5 percent
Elevation: 250 to 800 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Taxonomic Class

Fine-loamy, mixed, superactive, hyperthermic Typic Argiustolls

Typical Pedon

Pernitas sandy clay loam in an area of Pernitas sandy clay loam, 1 to 5 percent slopes; in rangeland; Clegg NE, Texas USGS topographic quadrangle; Longitude: 28 degrees, 12 minutes, 21.91 seconds North; Longitude: 98 degrees, 22 minutes, 18.80 seconds West. UTM Easting: 561640 meters, UTM Northing: 3120192 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 7 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky, slightly plastic; common very fine roots; common very fine tubular pores; strong effervescence; slightly alkaline; clear smooth boundary.
Bt—7 to 16 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark brown (10YR 2/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly plastic and moderately sticky; common very fine roots; common very fine pores; 10 percent very dark brown (10YR 2/2) clay films on surfaces of peds; strong effervescence; slightly alkaline; gradual smooth boundary.
Btk1—16 to 26 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate medium angular blocky; slightly hard, friable, slightly sticky and moderately plastic; common very fine roots; common very fine pores; 15 percent dark brown (10YR 3/3) clay films on faces of

peds; 2 percent fine threadlike very pale brown (10YR 8/2) carbonate masses; violent effervescence; moderately alkaline; gradual smooth boundary.

Btk2—26 to 38 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 5/3) moist; moderate coarse prismatic structure parting to moderate coarse angular blocky; slightly hard, friable moderately sticky and moderately plastic; common very fine roots; common very fine tubular pores; 10 percent distinct brown (10YR 4/3) clay films on vertical faces of peds; 3 percent fine threadlike white (10YR 8/1) carbonate masses; 1 percent medium very pale brown (10YR 8/2) carbonate masses; violent effervescence; slightly alkaline; clear wavy boundary.

Bk1—38 to 54 inches; very pale brown (10YR 7/3) sandy clay loam, pale brown (10YR 6/3) moist; weak coarse subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine roots; 35 percent coarse white (10YR 8/1) carbonate masses; violent effervescence; moderately alkaline gradual wavy boundary.

Bk2—54 to 80 inches; very pale brown (10YR 7/3) sandy clay loam, light yellowish brown (10YR 6/4) moist; weak coarse subangular blocky structure; slightly hard, very friable; slightly sticky, slightly plastic; 1 percent fine white (10YR 8/1) carbonate nodules and 15 percent medium white (10YR 8/1) carbonate masses; violent effervescence; moderately alkaline.

Range in Characteristics

Soil moisture: A typic ustic moisture regime. The soil moisture control section is dry in some or all parts for more than 90 days but less than 180 cumulative days in normal years. June through August and December through February are the driest months. These soils are intermittently moist in September through November and March through May.

Solum thickness: More than 80 inches
Depth to calcic horizon: 20 to 40 inches
Particle-size control section (weighted average):
  Clay content: 24 to 35 percent

A horizon

Hue: 10YR
Value: 3 or 4
Chroma: 1 to 3
Texture: Fine sandy loam or sandy clay loam
Calcium carbonate equivalent: 5 to 10 percent
Effervescence: None to slight
Reaction: Slightly alkaline or moderately alkaline

Bt1 horizon

Hue: 7.5YR or 10YR
Value: 4 to 6
Chroma: 2 to 4
Texture: Sandy clay loam or clay loam
Silicate clay content: 21 to 35 percent
Calcium carbonate equivalent: 8 to 17 percent
Effervescence: Very slight to strong
Reaction: Slightly alkaline or moderately alkaline

Btk horizon

Hue: 7.5YR or 10YR
Value: 4 to 7
Chroma: 3 or 4

Texture: Sandy clay loam, clay loam, or sandy clay
Secondary carbonates: 0 to 25 percent fine to coarse irregular and threadlike masses
Silicate clay content: 25 to 40 percent
Calcium carbonate equivalent: 10 to 20 percent
Effervescence: Slight or strong
Reaction: Moderately alkaline

Bk horizon

Hue: 7.5YR or 10YR
Value: 6 to 8
Chroma: 2 to 4
Texture: Sandy clay loam or clay loam
Secondary carbonates: 10 to 40 percent by volume of masses and concretions, up to 3.5 cm diameter
Calcium carbonate equivalent: 15 to 50 percent and decreases with depth
Effervescence: Strong or violent
Reaction: Moderately alkaline

Picosa Series

Depth class: Very shallow to shallow to paralithic bedrock
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.6 to 2.0 in/hr (moderate)
Landscape: Inland, dissected coastal plains
Landform: Ridges
Parent material: Loamy residuum weathered from sandstone
Slope: 1 to 8 percent
Elevation: 210 to 490 feet
Mean annual precipitation: 21 to 28 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 261 to 301 days

Taxonomic Class

Loamy, mixed, superactive, hyperthermic, shallow Entic Haplustolls

Typical Pedon

Picosa sandy clay loam in an area of Whitsett-Picosa complex, 1 to 8 percent slopes; in shrub cover; Calliham NW, Texas USGS topographic quadrangle; Longitude: 28 degrees, 26 minutes, 50.48 seconds North; Longitude: 98 degrees, 29 minutes, 57.70 seconds West. UTM Easting: 549020 meters, UTM Northing: 3146862 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 8 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark gray (10YR 3/1) moist; moderate fine subangular blocky structure; firm, hard, slightly sticky, slightly plastic; common very fine and common fine roots; 10 percent angular sandstone gravel; strong effervescence; neutral; diffuse wavy boundary.

AC—8 to 19 inches; very dark grayish brown (10YR 3/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist (A); light yellowish brown (2.5Y 6/3) weakly cemented, partially weathered, tuffaceous sandstone fragments, light olive brown (2.5Y 5/3) moist; weak fine subangular blocky structure; firm, hard, slightly sticky, slightly plastic (A); common very fine and common fine roots; 4 percent coarse distinct irregular carbonate masses with clear boundaries around rock fragments; 10 percent angular tuffaceous sandstone parachanners; violent effervescence; slightly alkaline; abrupt wavy boundary.

Crk—19 to 80 inches; light yellowish brown (2.5Y 6/3) weakly cemented tuffaceous sandstone bedrock, light olive brown (2.5Y 5/3) moist; 10 percent coarse carbonate masses in cracks; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil moisture: A typic ustic moisture regime. The soil moisture control section is dry in some or all parts for more than 90 days but less than 180 cumulative days in normal years. June through August and December through February are the driest months. These soils are intermittently moist in September through November and March through May.
Depth to weakly cemented sandstone: 5 to 14 inches
Surface fragments: 0 to 30 percent weakly cemented sandstone fragments

A horizon

Hue: 10YR
Value: 3 to 5
Chroma: 1 to 3
Texture: Fine sandy loam, loam, sandy clay loam, or clay loam
Clay content: 18 to 35 percent
Rock fragments: 0 to 20 percent, weakly consolidated sandstone
Effervescence: None to strong
Reaction: Neutral or moderately alkaline

AC horizon

A part

Hue: 10YR or 2.5Y
Value: 3 to 5
Chroma: 1 to 3
Texture: Fine sandy loam, loam, sandy clay loam, or clay loam
Clay content: 18 to 35 percent
Secondary carbonates: 0 to 5 percent, fine to coarse, threadlike, masses, and nodules on rock fragments
Rock fragments: 0 to 20 percent, angular sandstone parachanners
Effervescence: None to strong
Reaction: Slightly alkaline or moderately alkaline

C part

Hue: 10YR or 2.5Y
Value: 6 to 8
Chroma: 1 to 3
Texture: Fragments of weakly cemented tuffaceous sandstone and claystone bedrock
Effervescence: None to slight
Reaction: Neutral to moderately alkaline

Cr layer

Hue: 10YR or 2.5 Y
Value: 6 to 8
Chroma: 1 to 3
Other features: Some pedons contain yellowish brown staining on the unweathered fragments
Texture: Weakly cemented tuffaceous sandstone bedrock interbedded with claystone of the Jackson Group
Effervescence: None to slight
Reaction: Neutral to moderately alkaline

Rhymes Series

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability class of the most limiting soil layer: 0.2 to 0.6 in/hr (moderately slow)
Landscape: River valleys
Landform: Stream terraces
Parent material: Loamy alluvium
Slope: 1 to 5 percent
Elevation: 80 to 450 feet
Mean annual precipitation: 24 to 34 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 270 to 290 days

Taxonomic Class

Loamy, siliceous, active, hyperthermic Grossarenic Paleustalfs

Typical Pedon

Rhymes loamy fine sand in an area of Rhymes-Nusil complex, 1 to 3 percent slopes; in shrub cover; La Chusa Hill, Texas USGS topographic quadrangle; Longitude: 28 degrees, 14 minutes, 32.23 seconds North; Longitude: 98 degrees, 24 minutes, 13.12 seconds West. UTM Easting: 558504 meters, UTM Northing: 3124186 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 6 inches; brown (10YR 5/3) loamy fine sand, dark brown (10YR 3/3) moist; single grain; loose, very friable, nonsticky, nonplastic; slightly neutral; gradual smooth boundary.

E—6 to 17 inches; brown (10YR 6/3) loamy sand, brown (10YR 4/3) moist; weak medium subangular blocky structure; loose, very friable, nonsticky, nonplastic; neutral; clear smooth boundary.

BE—17 to 43 inches; pale brown (10YR 6/3) loamy sand, brown (10YR 5/3) moist; weak coarse subangular blocky structure; loose, friable; nonsticky, nonplastic; neutral; abrupt smooth boundary.

Bt—43 to 80 inches; reddish yellow (7.5YR 6/6) sandy clay loam, brown (7.5YR 4/4) moist; moderate coarse subangular blocky structure; very hard, friable, slightly sticky, moderately plastic; 35 percent distinct clay films on all faces of peds; 30 percent medium reddish yellow (7.5YR 6/8) moist, masses of oxidized iron; 5 percent fine gray (10YR 5/1) moist, iron depletions; neutral.

Range in Characteristics

Soil moisture: A typic ustic moisture regime. The soil moisture control section is dry in some or all parts for more than 90 days but less than 180 cumulative days in normal years. June through August and December through February are the driest months. These soils are intermittently moist in September through November and March through May.

Solum thickness: More than 80 inches
Depth to argillic horizon: 40 to 78 inches
Depth to secondary calcium carbonate: 20 to 80 inches
Particle-size control section (weighted average):
  Clay content: 18 to 35 percent

A horizon

Hue: 7.5YR or 10YR
Value: 4 to 6

Chroma: 2 to 4
Texture: Fine sand, loamy sand, or loamy fine sand
Reaction: Moderately acid to neutral

E and BE horizons (where present)

Hue: 7.5YR or 10YR
Value: 6 to 8
Chroma: 2 to 6
Texture: Fine sand, loamy sand, or loamy fine sand
Redox concentrations: None to common, fine or medium, faint or distinct, yellow or brown masses of iron accumulation
Reaction: Moderately acid to neutral

Bt horizon

Hue: 7.5YR or 10YR
Value: 5 to 7
Chroma: 2 to 6
Texture: Fine sandy loam or sandy clay loam
Clay content: 18 to 35 percent
Redox concentrations: Few to common, fine or medium, faint to prominent, shades of brown, yellow, or red
Redox depletions: Few, fine, prominent, distinct, shades of gray
Reaction: Moderately acid to slightly alkaline

BC or BCk horizons (where present)

Hue: 7.5YR or 10YR
Value: 5 to 8
Chroma: 2 to 6
Texture: Fine sandy loam or sandy clay loam
Clay content: 15 to 30 percent
Secondary carbonates: Up to 4 percent, fine or medium, concretions and masses
Reaction: Moderately acid to moderately alkaline

Rosenbrock Series

Depth class: Very deep to densic bedrock
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.001 to 0.06 in/hr (very slow)
Landscape: Inland, dissected coastal plains
Landform: Interfluves
Parent material: Clayey alluvium over weakly cemented tuffaceous siltstone
Slope: 1 to 3 percent
Elevation: 320 to 500 feet
Mean annual precipitation: 28 to 32 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 275 to 290 days

Taxonomic Class

Fine, smectitic, hyperthermic Typic Haplusterts

Typical Pedon

Rosenbrock clay in an area of Rosenbrock clay, 1 to 3 percent slopes; in shrub cover; Ray Point, Texas USGS topographic quadrangle; Longitude: 28 degrees, 36 minutes, 13.00 seconds North; Longitude: 98 degrees, 6 minutes, 39.00 seconds West. UTM

Easting: 586935 meters, UTM Northing: 3164393 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 6 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; moderate fine and medium subangular blocky structure; firm, hard, moderately sticky, moderately plastic; many fine and medium roots; many fine low continuity vesicular and tubular pores; few snail shell fragments; violent effervescence; moderately alkaline; clear smooth boundary.

Bw1—6 to 18 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; moderate fine and medium subangular blocky structure; firm, hard, moderately sticky, moderately plastic; many fine roots; many fine low continuity vesicular and tubular pores; 5 percent pressure faces; 10 percent carbonate threads; few fine concretions of calcium carbonate; few snail shell fragments; few insect casts; violent effervescence; moderately alkaline; gradual wavy boundary.

Bw2—18 to 32 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; moderate medium subangular blocky structure; very firm, very hard, moderately sticky, moderately plastic; 10 percent pressure faces; few insect casts; violent effervescence; moderately alkaline; gradual wavy boundary.

Bw3—32 to 44 inches; very dark grayish brown (10YR 3/2) clay, very dark gray (10YR 3/1) moist; moderate fine and medium subangular blocky structure; firm, hard, moderately sticky, moderately plastic; common pressure faces; strong effervescence; moderately alkaline; gradual wavy boundary.

Bkss—44 to 56 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; moderate fine and medium subangular blocky structure; firm, hard, moderately sticky, moderately plastic; common fine threads and concretions of calcium carbonate; strong effervescence; moderately alkaline; clear wavy boundary.

BCk—56 to 63 inches; 70 percent grayish brown (10YR 5/2) clay loam (Bk), dark grayish brown (10YR 4/2) moist; 30 percent white (10YR 8/1) weakly cemented tuffaceous siltstone with loam texture (C), very pale brown (10YR 8/2) moist; Bk horizon has weak fine and medium subangular blocky structure; firm, slightly hard, slightly sticky, slightly plastic; violent effervescence; moderately alkaline; clear wavy boundary.

2Cdk—63 to 80 inches; white (10YR 8/1) tuffaceous siltstone with silt loam texture, very pale brown (10YR 8/2) moist; common soft masses and nodules of calcium carbonate; violent effervescence; moderately alkaline.

Range in Characteristics

Soil moisture: A typic ustic moisture regime. The soil moisture control section is dry in some or all parts for more than 90 days but less than 180 cumulative days in normal years. June through August and December through February are the driest months. These soils are intermittently moist in September through November and March through May.

Solum thickness: 40 to 60 inches.

Vertic features: Few distinct slickensides are at a depth of 20 to 40 inches. When dry, the soil has cracks up to 1 inch wide that extend to a depth of more than 20 inches.

Reaction: Slightly alkaline or moderately alkaline

A horizon

Hue: 10YR
Value: 2 or 3
Chroma: 1
Texture: Silty clay or clay
Secondary carbonates: 0 to 2 percent, fine, concretions
Effervescence: Slight to violent
Reaction: Slightly alkaline and moderately alkaline

Bw horizon

Hue: 10YR
Value: 2 to 6
Chroma: 1 to 3
Texture: Silty clay or clay
Clay content: 45 to 60 percent
Secondary carbonates: 0 to 15 percent, fine, masses, and concretions
Effervescence: Slight to violent
Reaction: Slightly alkaline and moderately alkaline

Bk horizon

Hue: 10YR
Value: 3 to 7
Chroma: 1 to 4
Texture: Silty clay or clay
Clay content: 45 to 60 percent
Secondary carbonates: 5 to 15 percent, fine, masses, and concretions
Effervescence: Slight to violent
Reaction: Slightly alkaline and moderately alkaline

BCk horizon (where present)

Hue: 7.5YR or 10YR
Value: 3 to 5
Chroma: 1 to 3
Texture: Silty clay or clay
Secondary carbonates: 5 to 15 percent, masses
Effervescence: Slight to violent
Reaction: Moderately alkaline

CBk horizon (where present)

Hue: 7.5YR or 10YR
Value: 4 to 8
Chroma: 1 to 4
Texture: C part—weakly cemented loam or silt loam; Bk part—clay or silty clay
Horizon features: C part slakes in water; roots penetrate this material
Effervescence: None to violent
Reaction: Moderately alkaline

2Cdk layer

Hue: 7.5YR or 10YR
Value: 6 to 8
Chroma: 1 to 4
Texture: Weakly cemented tuffaceous siltstone, interbedded with thin layers of calcium carbonate with loam or silt loam texture
Layer features: Slakes in water

Salco Series

Depth class: Very deep
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.6 to 2.0 in/hr (moderate)
Landscape: Inland, dissected coastal plains
Landform: Interfluves

Parent material: Loamy, calcareous, alluvium and/or tuffaceous residuum of Miocene age
Slope: 1 to 5 percent
Elevation: 160 to 620 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Taxonomic Class

Fine-loamy, mixed, superactive, hyperthermic Aridic Argiustolls

Typical Pedon

Salco fine sandy loam in an area of Salco fine sandy loam, 1 to 3 percent slopes; in shrub cover; Loma Alta NE, Texas USGS topographic quadrangle; Longitude: 28 degrees, 14 minutes, 39.73 seconds North; Longitude: 98 degrees, 33 minutes, 19.87 seconds West. UTM Easting: 543604 meters, UTM Northing: 3124353 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 5 inches; dark grayish brown (10YR 4/2), fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; very friable, soft, nonsticky, nonplastic; common very fine and common fine roots; slightly effervescent; slightly alkaline; gradual smooth boundary.
AB—5 to 10 inches; brown (10YR 4/3), fine sandy loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; friable, slightly hard, slightly sticky, slightly plastic; common very fine and common fine roots; slight effervescence; slightly alkaline; clear smooth boundary.
Bt—10 to 20 inches; yellowish brown (10YR 5/4) clay loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; firm, slightly hard, slightly sticky, slightly plastic; common fine roots; 5 percent distinct clay films on all faces of peds; 1 percent gravel; strong effervescence; moderately alkaline; gradual wavy boundary.
Btk—20 to 45 inches; light yellowish brown (10YR 6/4) sandy clay loam, pale brown (10YR 6/3) moist; moderate medium subangular blocky structure; friable, slightly hard, slightly sticky, slightly plastic; 5 percent fine threadlike carbonate masses in matrix; violent effervescence; moderately alkaline gradual smooth boundary.
Bk—45 to 80 inches; very pale brown (10YR 7/3) fine sandy loam, light yellowish brown (10YR 6/4) moist; weak medium subangular blocky structure; very friable, soft, nonsticky, nonplastic; 2 percent fine irregular carbonate masses in matrix; violent effervescence; slightly alkaline.

Range in Characteristics

Soil moisture: An aridic ustic moisture regime. The soil moisture control section is moist in some or all parts for less than 90 consecutive days in normal years. June to August and December to February are the driest months, while September to November and March to May are the wettest months.
Thickness of mollic epipedon: 10 to 17 inches
Depth to argillic horizon: 8 to 12 inches
Particle-size control section (weighted average):
  Clay content: 20 to 32 percent
  Rock fragments: 0 to 5 percent

A and AB horizon (where present)

Hue: 10YR
Value: 3 to 5
Chroma: 2 or 3
Texture: Fine sandy loam, loam, or sandy clay loam
Clay content: 15 to 23 percent

Calcium carbonate equivalent: 1 to 3 percent
Secondary carbonates: 0 to 1 percent, fine, masses, throughout
EC (dS/m): 0 to 2
SAR: 0 to 2
Effervescence: None or slight
Reaction: Slightly alkaline or moderately alkaline

Btk horizon

Hue: 7.5YR or 10YR
Value: 4 to 7
Chroma: 2 to 6
Texture: Sandy clay loam or clay loam
Clay content: 22 to 32 percent
Calcium carbonate equivalent: 4 to 18 percent
Secondary carbonates: 0 to 3 percent, fine, masses
EC (dS/m): 0 to 2
SAR: 0 to 3
Effervescence: Slight or strong
Reaction: Slightly alkaline or moderately alkaline

Bk horizon

Hue: 7.5YR or 10YR
Value: 6 or 7
Chroma: 3 or 4
Texture: Fine sandy loam, loam, sandy clay loam, or clay loam
Clay content: 12 to 22 percent
Calcium carbonate equivalent: 15 to 25 percent
Secondary carbonates: 0 to 2 percent, fine, masses
EC (dS/m): 0 to 5
SAR: 0 to 5
Effervescence: Slight to violent
Reaction: Slightly alkaline or moderately alkaline

Sancajo Series

Depth class: Shallow to petrocalcic
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.6 to 2.0 in/hr (moderate)
Landscape: Inland, dissected coastal plains
Position on landform: Summits, shoulders
Parent material: Loamy alluvium over weakly cemented siltstone
Slope: 1 to 8 percent
Elevation: 200 to 500 feet
Mean annual precipitation: 20 to 28 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 250 to 300 days

Taxonomic Class

Loamy-skeletal, mixed, superactive, hyperthermic, shallow Petrocalcic Calciustolls

Typical Pedon

Sancajo very gravelly loam in an area of Sancajo very gravelly loam, 1 to 8 percent slopes; in shrub cover; Calliham, Texas USGS topographic quadrangle; Longitude: 28 degrees, 26 minutes, 14.00 seconds North; Longitude: 98 degrees, 16 minutes, 59.99

seconds West. UTM Easting: 570179 meters, UTM Northing: 3145846 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A1—0 to 6 inches; dark grayish brown (10YR 4/2) very gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; friable, slightly hard, friable; common fine roots and few medium roots; 5 percent fragments of calcium carbonate from degraded petrocalcic and 10 percent chert gravels; strong effervescence; moderately alkaline; clear wavy boundary.

A2—6 to 11 inches; dark grayish brown (10YR 4/2) extremely cobbly loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium granular structure; friable, slightly hard; many fine roots and common medium roots; 60 percent cobble fragments of calcium carbonate derived from degraded petrocalcic; 10 percent chert gravels; strong effervescence; moderately alkaline; abrupt smooth boundary.

Bkkm—11 to 18 inches; white (10YR 8/1) cemented material, light gray (10YR 7/1) moist; massive; indurated; fractures are 3 to 8 feet apart; violent effervescence; moderately alkaline; abrupt smooth boundary.

BCk—18 to 38 inches; light gray (10YR 7/2) silt loam, light brownish gray (10YR 6/2) moist; weak fine granular structure; friable, very hard; many fine roots and common medium roots; 14 percent irregular carbonate masses, 13 percent fine threadlike carbonate masses, and 13 percent fine carbonate masses; violent effervescence; moderately alkaline; clear wavy boundary.

Cr—38 to 80 inches; pale yellow (2.5Y 7/3) weakly cemented siltstone with a texture of silt loam, pale brown (10YR 6/3) moist; massive; firm, very hard; 3 percent carbonate coats on fractured rock fragments; 1 percent fine threadlike carbonate masses in cracks; violently effervescent; moderately alkaline.

Range in Characteristics

Soil moisture: A typic ustic moisture regime. The soil moisture control section is dry in some or all parts for more than 90 days but less than 180 cumulative days in normal years. June through August and December through February are the driest months. These soils are intermittently moist in September through November and March through May.

Depth to the petrocalcic horizon: 10 to 20 inches
Surface fragments: 10 to 75 percent coarse caliche fragments and siliceous gravel

A1 horizon

Hue: 10YR
Value: 2 to 4
Chroma: 1 to 3
Texture: Very gravelly loam, gravelly sandy clay loam, or gravelly clay loam
Rock fragments: 25 to 50 percent, siliceous gravel, 1 to 10 percent caliche cobbles
Effervescence: Slight to violent
Reaction: Slightly alkaline or moderately alkaline

A2 horizon

Hue: 10YR
Value: 2 to 4
Chroma: 1 to 3
Texture: Very gravely or extremely gravely loam, very cobbly, or extremely cobbly sandy clay loam, or very cobbly or extremely cobbly loam
Rock fragments: 35 to 80 percent, petrocalcic fragments, 0 to about 10 percent, siliceous gravel
Effervescence: Strongly or violently
Reaction: Slightly alkaline or moderately alkaline

Bkkm horizon

Hue: 10YR
Value: 7 or 8
Chroma: 1
Cementation: Strongly cemented or indurated
Effervescence: Strongly or violently
Reaction: Moderately alkaline

BCk horizon

Hue: 10YR or 2.5Y
Value: 7 or 8
Chroma: 1 to 3
Texture: Silt loam or loam
Secondary carbonates: 10 to 45 percent, films, threads, and concretions
Calcium carbonate equivalent: 20 to 40 percent
Other features: Weakly consolidated calcareous siltstone with texture of silt loam
Effervescence: Strongly or violently
Reaction: Moderately alkaline

Cr layer

Hue: 10YR or 2.5Y
Value: 7 or 8
Chroma: 1 or 3
Texture: Weakly cemented siltstone bedrock of silt loam or loam texture
Secondary carbonates: 0 to 5 percent, films, threads, and masses, mostly in fractures
Effervescence: Strongly or violently
Reaction: Moderately alkaline

Sarnosa Series

Depth class: Very deep
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.6 to 2.0 in/hr (moderate)
Landscape: Inland, dissected coastal plains
Landform: Interfluves
Parent material: Loamy residuum weathered from sandstone
Slope: 2 to 5 percent
Elevation: 200 to 400 feet
Mean annual precipitation: 26 to 36 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 275 to 290 days

Taxonomic Class

Coarse-loamy, mixed, superactive, hyperthermic Typic Calciustolls

Typical Pedon

Sarnosa fine sandy loam in an area of Sarnosa fine sandy loam, 2 to 5 percent slopes; in shrub cover; Clegg SW, Texas USGS topographic quadrangle; Longitude: 28 degrees, 6 minutes, 40.35 seconds North; Longitude: 98 degrees, 24 minutes, 55.49 seconds West. UTM Easting: 557419 meters, UTM Northing: 3109660 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 15 inches; brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; very friable, soft, nonsticky, nonplastic; many very fine roots; many very fine and fine interstitial pores; 5 percent irregular carbonate masses; strong effervescence; moderately alkaline; clear smooth boundary.

Bk1—15 to 30 inches; grayish brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; very friable, soft, nonsticky, nonplastic; many very fine roots; many very fine and fine interstitial and tubular pores; 5 percent irregular carbonate masses; strong effervescence; moderately alkaline; clear smooth boundary.

Bk2—30 to 51 inches; light gray (10YR 7/2) fine sandy loam, pale brown (10YR 6/3) moist; weak fine subangular blocky structure; very friable, soft, nonsticky, nonplastic; many very fine roots; common very fine tubular pores; 7 percent irregular carbonate masses; violent effervescence; moderately alkaline; gradual.

BCk—51 to 80 inches; very pale brown (10YR 8/2) sandy clay loam, light gray (10YR 7/2) moist; weak fine subangular blocky structure; friable, slightly hard, slightly sticky, slightly plastic; common very fine tubular pores; 30 percent irregular carbonate masses; violent effervescence; moderately alkaline.

Range in Characteristics

Soil moisture: A typic ustic moisture regime. The soil moisture control section is dry in some or all parts for more than 90 days but less than 180 cumulative days in normal years. June through August and December through February are the driest months. These soils are intermittently moist in September through November and March through May.

Solum thickness: 60 to greater than 80 inches to weakly or strongly cemented calcareous sandstone

Depth to calcium carbonate accumulations: 15 to 40 inches

Calcium carbonates: 5 to 20 percent by volume, in the form of concretions, films, threads, or masses, in the Bk and BCk horizons.

Particle-size control section (weighted average):

Clay content: 18 to 30 percent
Carbonate *clay content:* 1 to 10 percent
Calcium carbonate equivalent: 5 to 20 percent

A horizon

Hue: 10YR
Value: 3 to 5
Chroma: 1 to 3
Texture: Fine sandy loam, loam, or sandy clay loam
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

Bw horizon (where present)

Hue: 7.5YR or 10YR
Value: 4 to 6
Chroma: 2 to 4
Texture: Fine sandy loam, loam, or sandy clay loam
Clay content: 8 to 22 percent
Carbonate *Clay content:* 1 to 5 percent
Secondary carbonates: None or few, threads, masses, films, or nodules
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

Bk horizon

Hue: 7.5YR or 10YR
Value: 5 to 8

Chroma: 2 to 4
Texture: Fine sandy loam, loam, or sandy clay loam
Clay content: 8 to 22 percent
Carbonate clay content: 2 to 7 percent
Secondary carbonates: Few to common, threads, masses, films, or nodules
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

BCk horizon

Hue: 7.5YR or 10YR
Value: 6 to 8
Chroma: 2 to 6
Texture: Fine sandy loam, loam, or sandy clay loam
Clay content: 8 to 22 percent
Carbonate clay content: 2 to 7 percent
Secondary carbonates: Few to common, threads, masses, films, or nodules
Sandstone fragments: 0 to 15 percent; fine and medium, weakly cemented
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

C horizon (where present)

Hue: 10YR
Value: 7 or 8
Chroma: 3 or 4
Texture: Weakly to moderately cemented sandstone that has texture of loamy fine sand, fine sandy loam, loam, or sandy clay loam
Clay content: 8 to 25 percent
Carbonate clay content: 2 to 7 percent
Secondary carbonates: Few to common, threads, masses, films, or nodules
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

Sinton Series

Depth class: Very deep
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.6 to 2.0 in/hr (moderate)
Landscape: River valleys
Landform: Flood plains
Parent material: Loamy alluvium
Slope: 0 to 2 percent
Elevation: 50 to 500 feet
Mean annual precipitation: 24 to 28 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 270 to 300 days

Taxonomic Class

Fine-loamy, mixed, superactive, hyperthermic Cumulic Haplustolls

Typical Pedon

Sinton sandy clay loam in an area of Sinton sandy clay loam, 0 to 2 percent slopes, frequently flooded; in shrub cover; Fitzpatrick Hollow, Texas USGS topographic quadrangle; Longitude: 28 degrees, 15 minutes, 20.07 seconds North; Longitude: 98

degrees, 32 minutes, 13.01 seconds West. UTM Easting: 545421 meters, UTM Northing: 3125601 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 9 inches; very dark grayish brown (10YR 3/2) sandy clay loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure; firm, moderately hard, slightly sticky, slightly plastic; many fine roots and common medium roots; many fine tubular pores; slight effervescence; slightly alkaline; gradual smooth boundary.

Bw1—9 to 17 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; firm, moderately hard, slightly sticky, slightly plastic; common fine roots and common medium roots; common fine pores; slight effervescence; slightly alkaline; gradual smooth boundary.

Bw2—17 to 34 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; firm, moderately hard, slightly sticky, slightly plastic; common fine roots and many medium roots; slight effervescence; slightly alkaline; gradual smooth boundary.

Bw3—34 to 80 inches; brown (10YR 5/3) sandy clay loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; firm, moderately hard, slightly sticky, slightly plastic; very few very fine roots; slight effervescence; slightly alkaline.

Range in Characteristics

Soil moisture: A typic ustic moisture regime. The soil moisture control section is dry in some or all parts for more than 90 days but less than 180 cumulative days in normal years. June through August and December through February are the driest months. These soils are intermittently moist in September through November and March through May.

Solum thickness: More than 60 inches
Thickness of the mollic epipedon: 20 to 40 inches
Depth to thin strata of contrasting textures: 25 to 50 inches
Particle-size control section (weighted average):
  Clay content: 20 to 35 percent

A horizon

Hue: 7.5YR or 10YR
Value: 3 or 4
Chroma: 1 to 3
Texture: Loam, sandy clay loam, or clay loam
Effervescence: None to slight
Reaction: Slightly alkaline or moderately alkaline

Bw or Bk horizon (where present)

Hue: 7.5YR or 10YR
Value: 4 to 8
Chroma: 1 to 6
Texture: Loam, sandy clay loam, or clay loam with strata of loamy fine sand and sand
Secondary carbonates: 0 to 3 percent, fine and medium, films and threads
Effervescence: None to slight
Reaction: Slightly alkaline or moderately alkaline

Tela Series

Depth class: Very deep
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.6 to 2.0 in/hr (moderate)
Landscape: Inland, dissected coastal plains

Landform: Drainageways
Parent material: Loamy alluvium
Slope: 0 to 2 percent
Elevation: 300 to 800 feet
Mean annual precipitation: 22 to 25 inches
Mean annual air temperature: 72 to 73 degrees F
Frost-free period: 270 to 320 days

Taxonomic Class

Fine-loamy, mixed, superactive, hyperthermic Aridic Argiustolls

Typical Pedon

Tela sandy clay loam in an area of Tela sandy clay loam, 0 to 2 percent slopes, flooded; in shrub cover; Biel Lake NE, Texas USGS topographic quadrangle; Longitude: 27 degrees, 55 minutes, 31.50 seconds North; Longitude: 98 degrees, 46 minutes, 31.20 seconds west longitude. UTM Easting: 522098 meters, UTM Northing: 3092653 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 8 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; friable, soft, slightly sticky; common very fine and common fine roots; common fine moderate continuity pores; slightly effervescent; neutral; clear smooth boundary.

Bt—8 to 16 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; firm, slightly hard, moderately sticky, moderately plastic; common very fine and common fine roots; common fine moderate continuity tubular pores; 70 percent faint clay films on all faces of peds; slightly effervescent; slightly alkaline; clear smooth boundary.

Btk1—16 to 28 inches; grayish brown (10YR 5/2) sandy clay loam, dark grayish brown (10YR 4/2) moist; strong medium prismatic structure parting to moderate medium subangular blocky; very firm, moderately hard, moderately sticky, common very fine roots and common fine roots; common fine moderate continuity tubular pores; 70 percent distinct clay films on all faces of peds; 2 percent fine prominent dendritic very weakly cemented white (10YR 8/1) carbonate masses, and 1 percent medium prominent dendritic very weakly cemented white (10YR 8/1) carbonate masses; slight effervescence; moderately alkaline; clear wavy boundary.

Btk2—28 to 37 inches; brown (10YR 5/3) sandy clay loam, brown (10YR 4/3) moist; weak medium prismatic structure parting to weak medium subangular blocky; very firm, moderately hard, moderately sticky, slightly plastic; common very fine and common fine roots; common fine moderate continuity tubular pores; 50 percent distinct clay films on all faces of peds; 3 percent fine prominent dendritic very weakly cemented white (10YR 8/1) carbonate masses, and 2 percent medium prominent dendritic very weakly cemented white (10YR 8/1) carbonate masses; violent effervescence; moderately alkaline; clear wavy boundary.

Btk3—37 to 51 inches; brown (10YR 5/3) sandy clay loam, brown (10YR 4/3) moist; weak medium prismatic structure parting to weak medium subangular blocky; very firm, moderately hard, moderately sticky, slightly plastic; common very fine roots; common fine moderate continuity tubular pores; 40 percent faint clay films on all faces of peds; 4 percent fine prominent dendritic very weakly cemented white (10YR 8/1) carbonate masses, and 3 percent medium prominent dendritic very weakly cemented white (10YR 8/1) carbonate masses; violent effervescence; moderately alkaline; clear wavy boundary.

Btk4—51 to 66 inches; grayish brown (10YR 5/2) sandy clay loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure parting to weak medium subangular blocky; very firm, slightly hard, slightly sticky, slightly plastic; common very fine roots; common fine moderate continuity tubular pores; 30 percent faint clay films on all faces of peds; 4 percent fine prominent dendritic very weakly cemented white (10YR 8/1) carbonate masses, 6 percent medium prominent dendritic very weakly cemented white (10YR 8/1) carbonate masses, and 2 percent coarse prominent spherical very weakly cemented white (10YR 8/1) carbonate masses; strong effervescence; moderately alkaline; gradual wavy boundary.

Btk5—66 to 80 inches; grayish brown (10YR 5/2) sandy clay loam, dark grayish brown (10YR 4/2) moist; weak fine and medium angular blocky structure; very firm, slightly hard, slightly sticky, slightly plastic; common very fine roots; common fine moderate continuity tubular pores; 30 percent faint clay films on all faces of peds; 2 percent fine prominent dendritic very weakly cemented white (10YR 8/1) carbonate masses, 2 percent medium prominent dendritic very weakly cemented white (10YR 8/1) carbonate masses, and 15 percent coarse prominent spherical very weakly cemented white (10YR 8/1) carbonate masses; strong effervescence; moderately alkaline.

Range in Characteristics

Soil moisture: An aridic ustic moisture regime. The soil moisture control section is moist in some or all parts for less than 90 consecutive days in normal years. June to August and December to February are the driest months, while September to November and March to May are the wettest months.

Solum thickness: More than 80 inches
Depth to argillic horizon: 6 to 14 inches
Depth to secondary carbonates: 12 to 34 inches

A horizon

Hue: 10YR
Value: 3 to 5
Chroma: 1 to 3
Texture: Loam or sandy clay loam
Effervescence: None to strong
Reaction: Neutral or slightly alkaline

Bt horizon

Hue: 10YR
Value: 3 to 6
Chroma: 2 or 3
Texture: Sandy clay loam or clay loam
Effervescence: None to strong
Reaction: Neutral or slightly alkaline

Btk horizon

Hue: 10YR
Value: 4 to 8
Chroma: 2 or 3
Texture: Sandy clay loam or clay loam
Effervescence: Very slight to violent
Reaction: Slightly alkaline

Bk horizon (where present)

Hue: 10YR
Value: 6 to 8
Chroma: 2 or 3

Texture: Loam, sandy clay loam, or clay loam
Effervescence: Slight to violent
Reaction: Slightly alkaline

Tordia Series

Depth class: Deep to densic bedrock
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.001 to 0.06 in/hr (very slow)
Landscape: Inland, dissected coastal plains
Landform: Broad interfluves
Parent material: Clayey alluvium over clayey residuum weathered from shale and siltstone
Slope: 0 to 3 percent
Elevation: 200 to 500 feet
Mean annual precipitation: 26 to 34 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 270 to 285 days

Taxonomic Class

Fine, smectitic, hyperthermic Typic Haplusterts

Typical Pedon

Tordia clay in an area of Tordia clay, 0 to 3 percent slopes; in shrub cover; Fitzpatrick Hollow, Texas USGS topographic quadrangle; Longitude: 28 degrees, 20 minutes, 51.11 seconds North; Longitude: 98 degrees, 36 minutes, 36.92 seconds West. UTM Easting: 538197 meters, UTM Northing: 3135763 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 7 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; weak medium subangular blocky structure; very hard, very firm, very sticky, very plastic; common very fine, common fine, and common medium roots; many fine interstitial pores; 5 percent medium carbonate masses and 1 percent medium gypsum masses; 1 percent fine threadlike salt crystals; slight effervescence; non-saline; slightly alkaline; clear smooth boundary.

Bss—7 to 20 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; moderate medium subangular blocky structure; very hard, very firm, very stick, very plastic; common very fine and common fine roots; common very fine tubular pores; slight effervescence; slightly alkaline; gradual smooth boundary.

Bkss1—20 to 29 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; weak medium wedge structure; moderately hard, very firm, very sticky, very plastic; common very fine roots between peds; 5 percent faint slickensides (pedogenic); 3 percent fine threadlike carbonate masses; violent effervescence; non-saline; slightly alkaline; gradual wavy boundary.

Bkss2—29 to 39 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; weak medium wedge structure and moderate medium angular blocky structure; extremely hard, extremely firm; common very fine roots between peds; 10 percent faint slickensides (pedogenic); 2 percent fine threadlike carbonate masses; violent effervescence; slightly alkaline; gradual wavy boundary.

2BCkyz—39 to 53 inches; mottled grayish brown (2.5Y 5/2) and dark gray (10YR 4/1) clay, dark grayish brown (10YR 4/2) and very dark gray (10YR 3/1) moist; weak coarse subangular blocky structure; extremely hard, very firm, very stick, very plastic; 1 percent medium prominent yellowish red (5YR 5/8) masses of oxidized iron with sharp boundaries in cracks; 8 percent fine carbonate masses and 2 percent fine threadlike carbonate masses; 2 percent fine salt crystals; 5 percent medium gypsum masses; violent effervescence; slightly saline; slightly alkaline; gradual wavy boundary.

2Cdkyz—53 to 80 inches; pale olive (5Y 6/3) noncemented mudstone with a texture of clay, grayish brown (2.5Y 5/2) moist; massive; very hard, very firm; 2 percent medium prominent strong brown (7.5YR 5/8) masses of oxidized iron with sharp boundaries in cracks; 5 percent fine salt crystals in cracks; 8 percent medium carbonate masses in cracks; 10 percent medium gypsum masses in cracks; violent effervescence; moderately saline; moderately alkaline.

Range in Characteristics

Soil moisture: A typic ustic moisture regime. The soil moisture control section is dry in some or all parts for more than 90 days but less than 180 cumulative days in normal years. June through August and December through February are the driest months. These soils are intermittently moist in September through November and March through May.
Solum thickness: 40 to 60 inches
Vertic features: Cracks 1 to 2 inches wide at the surface extend to the Cr horizon and are more than 1/4 inch wide at depths of 20 inches.
Particle-size control section (weighted average):
Clay content: 40 to 60 percent

A horizon

Hue: 10YR
Value: 2 to 4
Chroma: 1
Texture: Clay loam or clay
Clay content: 32 to 45
EC (dS/m): 0 to 2
SAR: 0 to 2
Effervescence: Slight to strong
Reaction: Slightly alkaline or moderately alkaline

Bss horizon

Hue: 10YR
Value: 2 or 3
Chroma: 1
Texture: Clay loam or clay
Clay content: 35 to 65 percent
Ped and void surface features: Cracks in the Bss horizon are filled with darker material similar to the A horizon. Slickensides range from few to common.
*EC (dS/m):*0 to 3
SAR: 0 to 4
Effervescence: Slight to strong
Reaction: Slightly alkaline or moderately alkaline

Bkss horizon

Hue: 10YR
Value: 2 to 6
Chroma: 1 or 2
Texture: Clay loam or clay
Clay content: 38 to 61 percent
Calcium carbonate equivalent: 0 to 40 percent
EC (dS/m): 0 to 6

Gypsum: 0 to 20 percent crystals, concretions, and powdery masses
SAR: 2 to 10
Effervescence: Slight to violent
Reaction: Slightly alkaline and moderately alkaline

2BCk, 2BCkz, or 2BCkyz horizons (where present)

Hue: 10YR or 2.5Y
Value: 4 to 7
Chroma: 1 to 4
Texture: Clay or silty clay
Clay content: 40 to 55
Redoximorphic features: 0 to 5 percent medium prominent masses of oxidized iron with sharp boundaries in cracks
EC (dS/m): 2 to 16
Gypsum: 0 to 5 percent
SAR: 5 to 30
Effervescence: Slight to violent
Reaction: Slightly alkaline and moderately alkaline

2Cdkyz layer

Hue: 10YR to 5Y
Value: 5 to 8
Chroma: 1 to 4
Texture: Noncemented mudstone with a texture of silty clay or clay
Redoximorphic features: 0 to 5 percent medium prominent masses of oxidized iron with sharp boundaries in cracks
Gypsum: 0 to 10 percent
Clay content: 40 to 60 percent
Vertic properties: Darker streaks, usually from old root channels filled with materials from the A1 and Bw horizons
Cracks: Less than 4 inches apart
Effervescence: None to violent
Reaction: Neutral to moderately alkaline

Verick Series

Depth class: Very shallow and shallow to paralithic bedrock
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.6 to 2.0 in/hr (moderate)
Landscape: Inland, dissected coastal plains
Landform: Interfluves, ridges
Parent material: Calcareous loamy residuum weathered from sandstone
Slope: 1 to 5 percent
Elevation: 200 to 900 feet
Mean annual precipitation: 19 to 24 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 270 to 360 days

Taxonomic Class

Loamy, mixed, active, hyperthermic, shallow Aridic Haplustalfs

Typical Pedon

Verick fine sandy loam in an area of Verick fine sandy loam, 1 to 5 percent slopes; in shrub cover; Fitzpatrick Hollow, Texas USGS topographic quadrangle; Longitude: 28

degrees, 20 minutes, 33.14 seconds North; Longitude: 98 degrees, 36 minutes, 23.14 seconds West. UTM Easting: 538574 meters, UTM Northing: 3135211 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 2 inches; brown (7.5YR 5/3) fine sandy loam, brown (7.5YR 4/3) moist; weak fine granular structure; slightly hard, very friable, slightly sticky, slightly plastic; common very fine and common fine roots throughout; slightly effervescent; neutral; gradual smooth boundary.

Bt—2 to 6 inches; brown (7.5YR 5/3) sandy clay loam, brown (7.5YR 4/3) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky, moderately plastic; common fine and very fine roots and few medium roots throughout; 10 percent clay films on the faces of peds; slightly effervescent; neutral; abrupt smooth boundary.

Btk—6 to 8 inches; brown (7.5YR 5/2) sandy clay loam, brown (7.5YR 4/3) moist; weak medium subangular blocky structure; hard, friable, slightly sticky, moderately plastic; few very fine roots; 10 percent faint clay films on faces of peds; 2 percent fine threadlike carbonate concretions; 5 percent angular sandstone channers; strong effervescence; moderately alkaline; abrupt smooth boundary.

Cr—8 to 80 inches; light yellowish brown (2.5Y) weakly cemented sandstone bedrock, light olive brown (2.5Y 5/4) moist; a few very fine and fine roots between fractures; violently effervescent; moderately alkaline.

Range in Characteristics

Soil moisture: An aridic ustic moisture regime. The soil moisture control section is moist in some or all parts for less than 90 consecutive days in normal years. June to August and December to February are the driest months, while September to November and March to May are the wettest months.
Depth to paralithic contact: 10 to 20 inches
Depth to argillic horizon: 4 to 10 inches
Particle-size control section (weighted average):
  Clay content: 18 to 30 percent
  Rock fragments: 3 to 10 percent
CEC to clay ratio: 0.40 to 0.60

A horizon

Hue: 7.5YR to 2.5Y
Value: 5 or 6
Chroma: 2 to 4
Texture: Fine sandy loam or sandy clay loam
Clay content: 2 to 26 percent
Rock fragments: 0 to 15 percent
Calcium carbonate equivalent: 2 to 20 percent
Effervescence: Very slight to strong
Reaction: Neutral to moderately alkaline

Bt or Btk horizons

Hue: 7.5YR to 2.5Y
Value: 5 to 7
Chroma: 2 to 4
Texture: Fine sandy loam, loam, or sandy clay loam
Clay content: 5 to 30 percent
Clay films: Few or common, faint to distinct, on surfaces of peds, bridging sand grains, and lining pores
Rock fragments: 3 to 15 percent angular sandstone gravels or channers
Calcium carbonate equivalent: 10 to 30 percent

Secondary carbonates: 0 to 2 percent fine or medium, films, threads, masses or concretions, mainly on surfaces of peds and as coating on rock fragments
EC (dS/m): 0 to 2
Gypsum: 0 to 1 percent
Effervescence: Slight to violent
Reaction: Neutral to moderately alkaline

Cr layer

Hue: 7.5YR to 2.5Y
Value: 4 to 6
Chroma: 2 or 4
Kind: Platy sandstone bedrock
Cementation: Very weakly or weakly
Other features: Some pedons contain interbedded sandstone and claystone bedrock

Viboras Series

Depth class: Moderately deep
Drainage class: Moderately well drained
Permeability class of the most limiting soil layer: 0.001 to 0.06 in/hr (very slow)
Landscape: Inland, dissected coastal plains
Landform: Valley floors, valley sides
Parent material: Calcareous clayey residuum weathered from shale and siltstone
Slope: 0 to 5 percent
Elevation: 250 to 900 feet
Mean annual precipitation: 20 to 24 inches
Mean annual air temperature: 73 to 74 degrees F
Frost-free period: 290 to 340 days

Taxonomic Class

Fine, mixed, superactive, hyperthermic Torrertic Haplustepts

Typical Pedon

Viboras clay in an area of Viboras clay, 1 to 5 percent slopes; in shrub cover; Chargos Creek, Texas USGS topographic quadrangle; Latitude: 27 degrees, 11 minutes, 8.02 seconds North; Longitude: 99 degrees, 2 minutes, 0.46 seconds West. UTM Easting: 499147 meters, UTM Northing: 3000545 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 6 inches; brown (7.5YR 5/2) clay, brown (7.5YR 4/2) moist; weak fine granular structure, and moderate fine subangular blocky structure; very firm, hard, moderately sticky, moderately plastic; common fine and many very fine roots; common very fine and common fine tubular pores; strong effervescence; slightly saline; moderately alkaline; clear smooth boundary.

Bkn—6 to 12 inches; brown (7.5YR 5/3) clay, brown (7.5YR 5/3) moist; moderate medium prismatic structure parting to moderate medium angular blocky; very firm, hard, very sticky, very plastic; common very fine roots; 2 percent distinct organic stains; 10 percent fine carbonate masses and 3 percent fine threadlike carbonate masses; strongly effervescent; moderately saline; moderately alkaline; clear wavy boundary.

Bknyz—12 to 28 inches; pink (5YR 7/3) clay loam, light reddish brown (5YR 6/3) moist; moderate medium angular blocky structure; very firm, hard, very sticky, very plastic; 10 percent organic stains; 10 percent fine carbonate masses, and 5 percent fine threadlike carbonate masses; 2 percent fine threadlike salt crystals; 1 percent gypsum crystals; violently effervescent; moderately saline; moderately alkaline; clear wavy boundary.

Cdknz1—28 to 42 inches; pink (5YR 7/3) noncemented mudstone bedrock that has clay texture, light reddish brown (5YR 6/3) moist; massive; very firm, hard, very sticky, very plastic; 10 percent fine threadlike carbonate masses; 5 percent fine salt crystals; violently effervescent; strongly saline; moderately alkaline; clear wavy boundary.

Cdknz2—42 to 80 inches; light reddish brown (5YR 6/3) mudstone bedrock that has clay texture, reddish brown (5YR 5/3) moist; massive; very firm, hard, very sticky, very plastic; 2 percent fine prominent mottles; 10 percent carbonate masses and 5 percent carbonate concretions; 10 percent salt crystals; 2 percent gypsum crystal clusters; strongly effervescent; strongly saline; moderately alkaline.

Range in Characteristics

Soil moisture: An aridic ustic moisture regime. The soil moisture control section is moist in some or all parts for less than 90 consecutive days in normal years. June to August and December to February are the driest months, while September to November and March to May are the wettest months.

Depth to densic contact: 20 to 40 inches
Depth to cambic horizon: 3 to 28 inches
Particle-size control section (weighted average):
  Clay content: 40 to 60 percent
  Rock fragments: 0 to 2 percent
CEC to clay ratio: 0.60 to 0.90

A horizon

Hue: 5YR or 7.5YR
Value: 4 or 5
Chroma: 2 to 4
Texture: Clay loam or clay
Clay content: 35 to 60 percent
Rock fragments: 0 to 5 percent
Calcium carbonate equivalent: 0 to 20 percent
EC (dS/m): 1 to 8
Gypsum: 0 to 2 percent
SAR: 0 to 12 percent
Effervescence: None to strong
Reaction: Slightly alkaline or moderately alkaline

Bn, Bnz, or Bknyz horizons

Hue: 5YR or 7.5YR
Value: 4 to 6
Chroma: 2 to 4
Texture: Clay loam or clay
Clay content: 40 to 60 percent
Rock fragments: 0 to 5 percent
Base saturation: 100 percent
Calcium carbonate equivalent: 5 to 30 percent
Secondary carbonates: 0 to 5 percent, fine and medium, films, threads, and masses
EC (dS/m): 4 to 35
Gypsum: 0 to 5 percent
SAR: 10 to 35; averages 15 percent or more in the upper 20 inches and increases with depth
Effervescence: Strong or violent
Reaction: Moderately alkaline

Cdknz or Cdyz layer (where present)

Hue: 2.5YR to 7.5YR
Value: 4 to 7
Chroma: 2 to 4
Texture: Clay, clay loam, or silty clay loam
Clay content: 40 to 60 percent
Rock fragments: 0 to 10 percent mudstone parachanners
Base saturation: 100 percent
EC (dS/m): 4 to 35
Gypsum: 0 to 5 percent
SAR: 15 to 35
Effervescence: Strong or violent
Reaction: Moderately alkaline

Webb Series

Depth class: Very deep
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.2 to 0.6 in/hr (moderately slow)
Landscape: Inland, dissected coastal plains
Landform: Interfluves
Parent material: Loamy residuum weathered from sandstone
Slope: 1 to 3 percent
Elevation: 400 to 1000 feet
Mean annual precipitation: 20 to 26 inches
Mean annual air temperature: 70 to 72 degrees F
Frost-free period: 250 to 290 days

Taxonomic Class

Fine, smectitic, hyperthermic Aridic Paleustalfs

Typical Pedon

Webb fine sandy loam in an area of Webb very fine sandy loam, 1 to 3 percent slopes; in shrub cover; Millett, Texas USGS topographic quadrangle; Longitude: 28 degrees, 30 minutes, 45.25 seconds North; Longitude: 99 degrees, 11 minutes, 23.85 seconds West. UTM Easting: 481412 meters, UTM Northing: 3153999 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A1—0 to 9 inches; reddish brown (5YR 4/3) fine sandy loam, dark reddish brown (5YR 3/3) moist; weak fine and medium subangular blocky structure; very friable, slightly hard, nonsticky, nonplastic; common very fine and many fine roots; very few fine vesicular and few fine tubular pores; slightly acid; clear smooth boundary.

A2—9 to 14 inches; reddish brown (5YR 4/4) very fine sandy loam, dark reddish brown (5YR 3/4) moist; weak fine and medium subangular blocky structure; friable, hard, nonsticky, nonplastic; common very fine roots; few fine tubular pores; slightly acid; clear smooth boundary.

Bt—14 to 28 inches; reddish brown (5YR 4/4) sandy clay, dark reddish brown (5YR 3/4) moist; moderate fine and medium angular blocky structure; very firm, very hard, moderately sticky, moderately plastic; common very fine roots between peds; 10 percent distinct clay films on all faces of peds; neutral; gradual wavy boundary.

Btk1—28 to 34 inches; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; moderate fine and medium subangular blocky structure; firm, hard, moderately sticky, moderately plastic; common very fine roots; very few fine tubular pores; 15 percent distinct clay films on all faces of peds; 1 percent fine threadlike carbonate masses in matrix, 5 percent fine irregular carbonate masses in matrix, and 1 percent fine spherical strongly cemented carbonate nodules in matrix; strong effervescence; slightly alkaline; gradual wavy boundary.

Btk2—34 to 46 inches; reddish yellow (5YR 6/6) sandy clay loam, yellowish red (5YR 5/6) moist; weak fine and medium subangular blocky structure; friable, hard, moderately sticky, moderately plastic; few very fine roots; very few fine tubular pores; 2 percent faint clay films on vertical faces of peds; 3 percent fine threadlike carbonate masses in matrix, 3 percent fine irregular carbonate masses in matrix, and 3 percent fine spherical weakly cemented carbonate nodules in matrix; strong effervescence; slightly alkaline; clear wavy boundary.

Btk3—46 to 80 inches; yellow (10YR 7/6) sandy clay loam, brownish yellow (10YR 6/6) moist; weak fine and medium subangular blocky structure; firm, hard, moderately sticky, moderately plastic; few fine tubular pores; 2 percent faint clay films on vertical faces of peds; 2 percent fine distinct spherical strongly cemented iron-manganese nodules with clear boundaries in matrix; 3 percent fine distinct threadlike carbonate masses with clear boundaries in matrix, 3 percent fine distinct spherical weakly cemented carbonate nodules with clear boundaries in matrix, 3 percent medium distinct irregular carbonate masses with clear boundaries in matrix, 3 percent medium distinct spherical weakly cemented carbonate nodules with clear boundaries in matrix, and 3 percent coarse distinct irregular carbonate masses with clear boundaries in matrix; violent effervescence; slightly alkaline.

Range in Characteristics

Soil moisture: An aridic ustic moisture regime. The soil moisture control section is moist in some or all parts for less than 90 consecutive days in normal years. June to August and December to February are the driest months, while September to November and March to May are the wettest months.

Solum thickness: 60 to more than 80 inches
Secondary carbonates: Below depths of 18 inches
EC (dS/m): 0 to about 2 in the upper 30 inches and 0 to about 8 below 30 inches
Particle-size control section (weighted average):
Clay content: 35 to 45 percent

Ap and A horizons

Hue: 5YR or 7.5YR
Value: 4 or 5
Chroma: 2 to 6
Texture: Loamy fine sand, fine sandy loam, or very fine sandy loam
Reaction: Moderately acid to neutral

Bt horizon

Hue: 2.5YR or 5YR
Value: 4 to 6
Chroma: 3 to 8
Chroma below 50 inches: 6 or 8
Texture: Sandy clay loam, sandy clay, or clay
Effervescence: None to strong
Reaction: Slightly acid to slightly alkaline

Btk horizon

Hue: 2.5YR or 5YR
Value: 4 to 6
Chroma: 3 to 8
Chroma below 50 inches: 6 or 8

Texture: Sandy clay loam, sandy clay, or clay
Calcium carbonate concentrations: 1 to 45 percent fine to coarse nodules, and threadlike masses in the matrix
Redoximorphic concentrations: 0 to 5 percent fine iron manganese nodules and concretions
Effervescence: Slight to violent
Reaction: Slightly alkaline or moderately alkaline

Cd layer (where present)

Color: White, red, yellow, or brown
Kind: Noncemented sandstone
Texture: Slakes or crushes to fine sandy loam, very fine sandy loam, or sandy clay loam
Cementation: Noncemented sandstone bedrock that slakes

Weesatche Series

Depth class: Very deep
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.6 to 2.0 in/hr (moderate)
Landscape: Inland, dissected coastal plains
Landform: Paleoterraces
Parent material: Loamy alluvium
Slope: 0 to 5 percent
Elevation: 300 to 800 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 270 to 320 days

Taxonomic Class

Fine-loamy, mixed, superactive, hyperthermic Typic Argiustolls

Typical Pedon

Weesatche sandy clay loam in an area of Weesatche fine sandy loam, 3 to 5 percent slopes; in shrub cover; Clegg NE, Texas USGS topographic quadrangle; Longitude: 28 degrees, 8 minutes, 54.20 seconds North; Longitude: 98 degrees, 20 minutes, 23.21 seconds West. UTM Easting: 564826 meters, UTM Northing: 3113817 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 7 inches; very dark grayish brown (10YR 3/2) fine sandy loam, very dark brown (10YR 2/2) moist; moderate medium granular structure; friable, soft, nonsticky, nonplastic; many fine roots; neutral; clear smooth boundary.
Bt1—7 to 13 inches; dark brown (10YR 3/3) sandy clay loam, very dark brown (10YR 2/2) moist; moderate medium subangular blocky structure; firm, slightly hard, slightly sticky, moderately plastic; common fine roots; 10 percent distinct clay films; noneffervescent; slightly alkaline; clear smooth boundary.
Bt2—13 to 21 inches; brown (7.5YR 4/4) sandy clay loam, dark brown (7.5YR 3/4) moist; moderate medium angular blocky structure; firm, slightly hard, slightly sticky, moderately plastic; common fine roots; 10 percent distinct clay films; noneffervescent; slightly alkaline; clear smooth boundary.
Btk1—21 to 28 inches; brown (7.5YR 4/4) sandy clay loam, dark brown (7.5YR 3/4) moist; moderate medium subangular blocky structure; firm, slightly hard, slightly sticky, moderately plastic; few fine roots; 3 percent distinct clay films; 5 percent fine carbonate masses; very slight effervescence; moderately alkaline; gradual smooth boundary.

Btk2—28 to 48 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; firm, slightly hard, slightly sticky, moderately plastic; few very fine and few fine roots; 3 percent distinct clay films; 10 percent fine carbonate masses; strong effervescence; moderately alkaline; gradual smooth boundary.

Bk—48 to 80 inches; light brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 5/3) moist; weak medium subangular blocky structure; firm, slightly hard, slightly sticky, slightly plastic; very few fine roots; 15 percent fine carbonate masses; strong effervescence; moderately alkaline.

Range in Characteristics

Soil moisture: A typic ustic moisture regime. The soil moisture control section is dry in some or all parts for more than 90 days but less than 180 cumulative days in normal years. June through August and December through February are the driest months. These soils are intermittently moist in September through November and March through May.

Depth to argillic horizon: 6 to 30 inches
Depth to calcic horizon: 25 to 80 inches
Depth to secondary carbonates: 20 to 80 inches
Rock fragments: 0 to 15 percent siliceous gravels
Particle-size control section (weighted average):
  Clay content: 20 to 32 percent

A horizon

Hue: 7.5YR or 10YR
Value: 2 to 5
Chroma: 1 to 3
Texture: Fine sandy loam, loam, or sandy clay loam
Reaction: Neutral or slightly alkaline

Bt horizon

Hue: 5YR to 10YR
Value: 2 to 5
Chroma: 1 to 4
Texture: Sandy clay loam, sandy clay, or clay loam
Clay content: 25 to 38 percent
Redox concentrations: None to common, in shades of red, yellow, or brown
Effervescence: None or very slight
Reaction: Slightly alkaline or moderately alkaline.

Btk or Bk horizons

Hue: 5YR to 10YR
Value: 3 to 7
Chroma: 2 to 8
Texture: Silt loam, loam, sandy clay loam, or clay loam`
Clay content: 20 to 35 percent
Calcium carbonate equivalent: 5 to 65 percent
Effervescence: Slight to violent
Reaction: Slightly alkaline or moderately alkaline

BCk horizon (where present)

Hue: 5YR to 10YR
Value: 3 to 8
Chroma: 2 to 6

Texture: Fine sandy loam, loam, sandy clay loam, or clay loam
Calcium carbonate equivalent: 10 to 65 percent
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

Weigang Series

Depth class: Very shallow to shallow to paralithic bedrock
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.001 to 0.06 in/hr (very slow)
Landscape: Inland, dissected coastal plains
Landform: Ridges
Parent material: Loamy residuum weathered from sandstone
Slope: 1 to 5 percent
Elevation: 210 to 470 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 270 to 320 days

Taxonomic Class

Loamy, mixed, active, hyperthermic, shallow Typic Argiustolls

Typical Pedon

Weigang fine sandy loam in an area of Weigang fine sandy loam, 1 to 5 percent slopes; in shrub cover; Fitzpatrick Hollow, Texas USGS topographic quadrangle; Longitude: 28 degrees, 20 minutes, 43.76 seconds North; Longitude: 98 degrees, 35 minutes, 17.86 seconds West. UTM Easting: 540350 meters, UTM Northing: 3135544 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 6 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium granular structure; very friable, soft, slightly sticky, nonplastic; common fine and many very fine roots; neutral; clear smooth boundary.

Bt—6 to 13 inches; very dark grayish brown (10YR 3/2) sandy clay loam, very dark brown (10YR 2/2) moist; moderate medium angular blocky structure; friable, slightly hard, slightly sticky, slightly plastic; common very fine roots; common very fine tubular pores; 15 percent clay films; neutral; gradual smooth boundary.

Btk—13 to 17 inches; brown (10YR 5/3) sandy clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly firm, slightly hard, slightly sticky, slightly plastic; common very fine roots; common very fine tubular pores; 10 percent clay films; 2 percent fine threadlike carbonate masses; strong effervescence; slightly alkaline; clear smooth boundary

Bk—17 to 19 inches; yellowish brown (10YR 5/4) sandy clay loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; firm, hard, moderately sticky, moderately plastic; 3 percent medium irregular carbonate masses; strong effervescence; slightly alkaline; abrupt smooth boundary.

Crk—19 to 80 inches; light gray (2.5Y 7/2) fractured sandstone, light gray (2.5Y 7/2) moist; 1 percent medium carbonate masses in cracks; slight effervescence; moderately alkaline.

Range in Characteristics

Soil moisture: A typic ustic moisture regime. The soil moisture control section is dry in some or all parts for more than 90 days but less than 180 cumulative days in normal years. June through August and December through February are the driest months. These soils are intermittently moist in September through November and March through May.

Solum thickness: 8 to 19 inches, and the range in thickness is common within horizontal distances of less than 20 feet
Depth to argillic horizon: 0 to 10 inches
Depth to paralithic contact: 19 inches

A horizon

Hue: 7.5YR or 10YR
Value: 3 to 5
Chroma: 1 to 3
Texture: Fine sandy loam, loam, clay loam, or sandy clay loam
Rock fragments: 0 to 5 percent angular sandstone channers
Reaction: Slightly acid to slightly alkaline

Bt or Btk horizons

Hue: 7.5YR or 10YR
Value: 2 to 5
Chroma: 1 to 3
Texture: Loam, sandy clay loam, or clay loam
Rock fragments: Sandstone 0 to 55 percent stones, 0 to 20 percent cobbles, and 0 to 15 percent channers
Effervescence: None to strong
Reaction: Slightly acid to slightly alkaline

BCk horizon

Hue: 7.5YR or 10YR
Value: 4 to 6
Chroma: 3 to 6
Texture: Loam, sandy clay loam, or clay loam
Rock fragments: Sandstone 0 to 55 percent stones, 0 to 20 percent cobbles, and 0 to 15 percent channers
Effervescence: Very slight to violent
Reaction: Slightly alkaline to strongly alkaline

Cr layer

Kind: Sandstone interbedded with claystone bedrock with thin layers of calcium carbonate.
Effervescence: None to strong
Reaction: Slightly acid to moderately alkaline
Cementation: Very weakly and weakly

Whitsett Series

Depth class: Moderately deep to paralithic bedrock
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.06 to 0.2 in/hr (slow)
Landscape: Inland, dissected coastal plains
Landform: Ridges
Parent material: Loamy residuum weathered from sandstone and shale
Slope: 1 to 8 percent
Elevation: 210 to 490 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 265 to 301 days

Taxonomic Class

Fine-loamy, mixed, superactive, hyperthermic Typic Argiustolls

Typical Pedon

Whitsett fine sandy loam in an area of Whitsett fine sandy loam, 1 to 5 percent slopes; in shrub cover; Willow Hollow Tank, Texas USGS topographic quadrangle; Longitude: 28 degrees, 36 minutes, 6.55 seconds North; Longitude: 98 degrees, 21 minutes, 35.54 seconds West. UTM Easting: 562587 meters, UTM Northing: 3164039 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 4 inches; very dark gray (10YR 3/1) fine sandy loam, black (10YR 2/1) moist; moderate fine granular structure; friable, soft, nonsticky, nonplastic; common fine roots and common medium roots; noneffervescent; neutral; clear smooth boundary.

Bt—4 to 13 inches; very dark gray (10YR 3/1) sandy clay loam, black (10YR 2/1) moist; moderate medium subangular blocky structure; friable, slightly hard, slightly sticky, slightly plastic; common fine and common coarse roots; 25 percent clay films on all faces of peds; slight effervescence; neutral; gradual smooth boundary.

Btk—13 to 24 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate coarse subangular blocky structure; firm, moderately hard, slightly sticky, slightly plastic; common fine roots; 20 percent distinct clay films on all faces of peds; carbonates, finely disseminated; strong effervescence; slightly alkaline; clear smooth boundary.

BCk—24 to 31 inches; light brownish gray (10YR 6/2) clay loam, light brownish gray (10YR 6/2) moist; very firm, hard, slightly sticky, slightly plastic; 5 percent coarse irregular carbonate masses in matrix; strong effervescence; slightly alkaline; gradual wavy boundary.

Cr—31 to 80 inches; white (2.5Y 8/1) weakly cemented sandstone bedrock, light gray (2.5Y 7/1) moist; calcareous sandstone bedrock, fractured at intervals of more than 10 inches; slight effervescence; moderately alkaline.

Range in Characteristics

Soil moisture: A typic ustic moisture regime. The soil moisture control section is dry in some or all parts for more than 90 days but less than 180 cumulative days in normal years. June through August and December through February are the driest months. These soils are intermittently moist in September through November and March through May.

Thickness of mollic epipedon: 10 to 15 inches
Depth to argillic horizon: 3 to 32 inches
Depth to paralithic contact: 20 to 40 inches
Particle-size control section (weighted average):
  Clay content: 22 to 34 percent
  Secondary carbonates: 0 to 5 percent

A horizon

Hue: 10YR
Value: 2 to 4
Chroma: 1 to 3
Texture: Fine sandy loam, loam, or sandy clay loam
Clay content: 15 to 30
Effervescence: None or very slight
Reaction: Neutral or slightly alkaline

Bt horizon

Hue: 7.5YR or 10YR
Value: 3 to 5

Chroma: 1 to 3
Texture: Sandy clay loam or clay loam
Clay content: 20 to 34 percent
Effervescence: None or slight
Reaction: Neutral or slightly alkaline

Btk horizon

Hue: 7.5YR or 10YR
Value: 4 to 6
Chroma: 2 to 4
Texture: Sandy clay loam or clay loam
Clay content: 20 to 34 percent
Secondary carbonates: 0 to 10 percent, masses, threads, and nodules
Effervescence: Slight or strong
Reaction: Slightly alkaline or moderately alkaline

BCk horizon

Hue: 7.5YR or 10YR
Value: 3 to 7
Chroma: 2 or 3
Texture: Sandy clay loam, clay loam, or sandy clay
Clay content: 20 to 40 percent
Secondary carbonates: 3 to 14 percent, masses, threads, and nodules
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

Cr layer

Hue: 10YR to 2.5Y
Value: 5 to 8
Chroma: 1 or 2
Paralithic materials: Weakly cemented sandstone bedrock; some pedons are interbedded with claystone bedrock and thin layers of calcium carbonate
Secondary carbonates: 0 to 5 percent, coatings, on faces of fragments and in fractures
Effervescence: None or slight
Reaction: Slightly acid to moderately alkaline

Zavala Series

Depth class: Very deep
Drainage class: Well drained
Permeability class of the most limiting soil layer: 2.0 to 6.0 in/hr (moderately rapid)
Landscape: River valleys
Landform: Flood plains
Parent material: Loamy alluvium
Slope: 0 to 2 percent
Elevation: 210 to 1,200 feet
Mean annual precipitation: 21 to 32 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 260 to 301 days

Taxonomic Class

Coarse-loamy, mixed, superactive, nonacid, hyperthermic Typic Ustifluvents

Typical Pedon

Zavala fine sandy loam, occasionally flooded in an area of Zavala fine sandy loam, 0 to 2 percent slopes, flooded; in shrub cover; Crowther, Texas USGS topographic quadrangle; Longitude: 28 degrees, 31 minutes, 27.28 seconds North; Longitude: 98 degrees, 27 minutes, 29.77 seconds West. UTM Easting: 553005 meters, UTM Northing: 3155397 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

Ap—0 to 11 inches; brown (10YR 4/3) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; loose, soft, nonsticky, nonplastic; common very fine and common fine roots; noneffervescent; neutral; gradual smooth boundary.

C—11 to 80 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist; massive; loose, soft, nonsticky, nonplastic; common very fine, common fine and common medium roots; noneffervescent; slightly alkaline.

Range in Characteristics

Soil moisture: A typic ustic moisture regime. The soil moisture control section is dry in some or all parts for more than 90 days but less than 180 cumulative days in normal years. June through August and December through February are the driest months. These soils are intermittently moist in September through November and March through May.

Particle-size control section (weighted average):
Clay content: 5 to 18 percent
Sand content: 50 to 85 percent

A or Ap horizon

Hue: 7.5YR or 10YR
Value: 4 to 6
Chroma: 2 to 6
Texture: Loamy fine sand, fine sandy loam, or loam
Effervescence: None
Reaction: Neutral to moderately alkaline

C horizon

Hue: 7.5YR or 10YR
Value: 4 to 6
Chroma: 2 to 6
Texture: Loamy fine sand, fine sandy loam, loam, or sandy clay loam
Other features: Individual strata range from 1/4 inch to 24 inches in thickness
Effervescence: None to very slight
Reaction: Neutral to moderately alkaline

Zavco Series

Depth class: Very deep
Drainage class: Well drained
Permeability class of the most limiting soil layer: 0.2 to 0.6 in/hr (moderately slow)
Landscape: Inland, dissected coastal plains
Landform: Drainageways, broad interfluves
Parent material: Loamy residuum weathered from shale and/or sandstone
Slope: 1 to 5 percent
Elevation: 450 to 900 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 68 to 72 degrees F
Frost-free period: 265 to 301 days

Taxonomic Class

Fine, mixed, active, hyperthermic Aridic Argiustolls

Typical Pedon

Zavco sandy clay loam (fig. 32) in an area of Zavco sandy clay loam, 1 to 5 percent slopes; in shrub cover; Pertle Creek, Texas USGS topographic quadrangle; Longitude: 28 degrees, 33 minutes, 29.33 seconds North; Longitude: 98 degrees, 40 minutes, 45.84 seconds West. UTM Easting: 531358 meters, UTM Northing: 3159076 meters, Zone 14. (Colors are for dry soil unless otherwise noted)

A—0 to 5 inches; dark yellowish brown (10YR 3/4) sandy clay loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; soft, very friable; common very fine roots; neutral; abrupt smooth boundary.

Bt1—5 to 15 inches; dark brown (7.5YR 3/3) sandy clay, dark brown (7.5YR 3/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky structure; slightly hard, friable; common very fine roots; common very fine pores; neutral; clear wavy boundary.

Bt2—15 to 27 inches; yellowish red (5YR 4/6) sandy clay, dark reddish brown (5YR 3/4) moist; moderate fine prismatic structure parting to moderate medium angular blocky; very hard, very firm, moderately sticky, moderately plastic; common very fine roots between peds; 25 percent reddish brown (5YR 4/4) dry, clay films; neutral; gradual wavy boundary.

Btk—27 to 51 inches; strong brown (7.5YR 5/6) clay loam, brown (7.5YR 4/4) moist; moderate medium prismatic structure parts to moderate medium angular blocky structure; firm; common very fine roots; 25 percent clay films; 35 percent medium and coarse white (10YR 8/1) dry, carbonate masses; strong effervescence; slightly alkaline; clear smooth boundary.

BCky—51 to 80 inches; light reddish brown (5YR 6/3) clay loam, reddish brown (5YR 5/3) moist; moderate coarse prismatic structure parting to moderate medium angular blocky structure; very hard, firm, moderately sticky, moderately plastic; 1 percent gypsum crystals; 25 percent medium threadlike carbonate masses and 15 percent coarse white (10YR 8/1) dry, irregular carbonate masses; slight effervescence; slightly alkaline.

Range in Characteristics

Soil moisture: An aridic ustic moisture regime. The soil moisture control section is moist in some or all parts for less than 90 consecutive days in normal years. June to August and December to February are the driest months, while September to November and March to May are the wettest months.

Depth to argillic horizon: 7 to 22 inches
Depth to secondary carbonates: 10 to 28 inches
Particle-size control section (weighted average):
  Clay content: 38 to 55 percent

A or AB (where present) horizons

Hue: 10YR, 7.5YR, and 5YR
Value: 3 or 4
Chroma: 2 to 4
Texture: Sandy clay loam or clay loam
Effervescence: Slight to violent
Reaction: Slightly acid to slightly alkaline

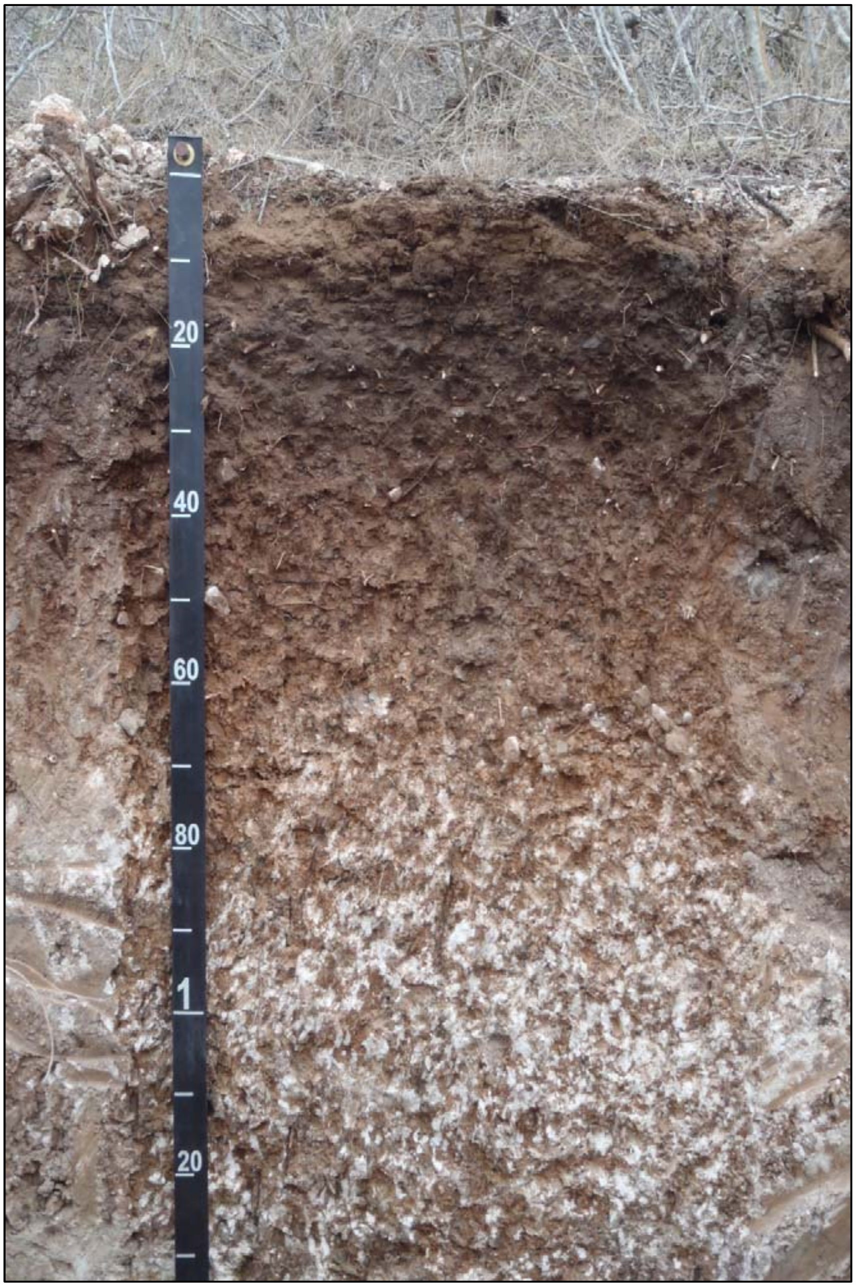

Figure 32.—Profile of Zavco sandy clay loam, 1 to 5 percent slopes. At a depth of 27 inches (68 cm), calcium carbonate masses have accumulated so thick that it restricts air and water uptake by the plant roots. (Scale in cm-centimeters)

Bt horizon

Hue: 5YR or 7.5YR
Value: 3 to 5
Chroma: 3 to 6
Texture: Sandy clay loam or sandy clay
Effervescence: Slight to violent
Reaction: Neutral to moderately alkaline

Btk Horizon

Hue: 5YR to 10YR
Value: 4 to 7
Chroma: 3 to 6
Texture: Sandy clay loam or clay loam
Secondary carbonates: 2 to 30 percent, fine and medium concretions or masses
EC (dS/m): 0 to 8
Effervescence: Slight to violent
Reaction: Slightly alkaline through moderately alkaline

BCky horizon

Hue: 5YR to 10YR
Value: 4 to 7
Chroma: 3 to 6
Texture: Sandy clay loam, sandy clay, or clay loam
Secondary carbonates: 2 to 30 percent, fine to coarse, irregular and threadlike masses
Gypsum; 0 to 5 percent fine and medium masses and crystals
EC (dS/m): 0 to 8
Effervescence: Slight to violent
Reaction: Slightly alkaline through moderately alkaline

Formation of the Soils

In this section, the factors of soil formation to include parent material, climate, plant and animal life, relief, and time are discussed and are related to the formation of the soils in McMullen County. Also, the processes of horizon differentiation and the surface geology of the counties are described.

Factors of Soil Formation

Soil is formed by the action of soil-forming processes on material deposited or accumulated by geological forces. The characteristics of a soil depend on the physical and mineralogical composition of the parent material, the climate under which the soil material has accumulated and has existed since accumulation, the plant and animal life on and in the soil, the relief, and the length of time the forces of soil development have acted on the soil material.

Climate and living organisms are active factors of soil formation. They act on the parent material that has accumulated through the weathering of rocks and slowly change it into a natural body that has genetically related horizons. The effects of climate and living organisms are conditioned by relief. The parent material affects the kind of soil profile that forms and, in extreme cases, determines it almost entirely. Finally, time is needed for changing the parent material into soil. Generally, a long time is needed for the development of distinct horizons.

The factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made regarding the effect of any one factor unless conditions are specified for the other factors.

Parent Material

Parent material is the unconsolidated organic and inorganic material in which a soil forms. The parent material determines the physical and chemical limits of the soil. In some cases soils form out of two or more parent materials.

Thick deposits of black clay were laid down in lagoonal, estuary environments on top of older alluvial coastal terraces sediments, resulting in striking contrast in parent material color within the soil profile. Dosrios and Esseville soils are examples of soils formed from two different types of alluvial deposits.

Other kinds of parent material are less dynamic and the soil forming process has taken many years to develop just a few feet of soil. The cuestas and mesa like landforms have soils that have formed in place for millions of years after an erosional sedimentary remnant was left high in the landscape. These soils receive hardly any additional moisture from runoff and have developed thin B layers on top of weakly cemented sandstones. Weigang, Picosa, and Whitsett soils are examples of soil formed out of residuum.

Climate

McMullen County has a subhumid climate with mild, dry winters and hot summers. Low rainfall and high evaporation rate, temperature, and wind are some of the climatic factors which influence soil formation.

The variable rainfall pattern causes the soil to be alternately wet and dry. When a clayey soil such as Montell becomes dry, it cracks. Animals, rainfall, and wind deposit surface soil in the cracks. During rains the cracks fill with water, the soil swells as it gets wet, and the cracks close. This alternate shrinking and swelling upon drying and wetting causes a rise and fall in the soil surface, and churning or mixing of the soil that has been termed "self swallowing." (UT-BEG, Austin Sheet, 1976) The cracks in these soils, initially, allow the soil to take in water rapidly and wet deeply. Deep soil development and gilgai microrelief are the results of these processes. Water moving through the soil can carry clay particles downward in suspension from the surface layer. The clay particles are deposited in the subsoil as the water flow ceases. As clay accumulates, permeability decreases, slowing future water movement, and deposition of clay accelerates. Rhymes soils have clay accumulations in their subsoils.

Rainfall also leaches minerals from the upper layers and deposits them in the lower layers. As a result, Colmena, Weesatche and many other soils have a layer in which calcium carbonate has accumulated.

Also, the accumulation of organic matter is affected by temperature and moisture. Low rainfall and high temperatures limit the vegetative growth and accumulation of organic matter in the soils. However, in those areas where more soil moisture is present, such as flood plains and depressional areas, the vegetative production and organic matter contents are higher than the surrounding upland soils. Near surface soil temperatures are lower where there is more vegetation, and the rate of decomposition of organic matter is generally slower.

Plant and Animal Life

Plants, animals, earthworms, insects, and micro-organisms are important factors in the formation of soils. The amount of organic matter and nitrogen in the soil, gains or losses in plant nutrients, and changes in soil structure and porosity are among the effects of living organisms.

Vegetation, predominantly grasses and brush, has played a major role in soil formation in McMullen County. Decayed roots contribute organic matter to the soils and leave channels and pores that provide passageways for the intake of air and water. Deep rooting brush plants bring nutrients from the subsoil to the surface.

Earthworms, insects, and burrowing animals mix soil materials and create channels for the downward movement of air, water, and plant roots into the soil. Actinomycetes, bacteria, and fungi break down primary forms of organic matter, create humus, and release plant nutrients which improve soil tilth and fertility.

Humans have greatly affected the soils in McMullen County. In the past, some rangeland has been overstocked with livestock and native wildlife. This resulted in overgrazing which caused the better grasses, brush, and forbs to decrease, and be replaced with less desirable grasses, brush, and forbs. Overgrazing by livestock and other animals increases the amount of bare ground and soil compaction, thereby increasing runoff and soil erosion.

Farming has resulted in excessive water and wind erosion in some areas. Crop residue management, terraces, grassed waterways, reduced tillage, and vegetated wind strips help control erosion on cropland. Soil compaction because of farm equipment has slowed the movement of air, moisture, and roots in the soil on much of the cropland in the survey area.

Relief

Relief or topography affects soil formation through its influence on drainage, erosion, and plant cover. The degree of development of a soil profile depends on the amount of water that enters the soil, provided other factors of soil formation are equal.

Soils such as Montell that are nearly level absorb more rainfall, have greater profile development, less water erosion, and less runoff, generally, than soils such as Lomart that are on slopes with higher gradient. Soils on steeper slopes may erode away nearly as fast as they form. On nearly level slopes, which are more stable, the rate of soil formation generally exceeds soil loss through erosion as deeper soil profiles develop. This is especially true on flood plains where sediment is deposited in some cases every year.

Time

The characteristics of a soil are determined mainly by the length of time that the soil forming factors have been active. Hundreds to thousands of years may be required for the formation of well-defined, genetic horizons. Genetically, the soils in McMullen County range from very young to old. Differences in the ages of the soils can be noted in their profiles.

The Sinton soil is a young soil which developed on recent flood plains. This soil consists of altered alluvial sediments.

Old soils are generally nearly level to gently undulating, and are on stable, upland positions on the landscape that are actually ancient stream terraces. The Olmedo soil is an old soil in which calcium carbonate was leached from the upper part of the profile, and accumulated as a layer of cemented caliche.

Processes of Horizon Differentiation

Soils are derived from the decomposition of the mineral particles they contain and from the plant and animal remains added to them. Silicate clays, mineral particles, humus, living organisms, and water have a major influence in determining the character of the soil. Soil layers, or horizons, are formed by additions, removals, transfers, and transformations within the soil profile. These processes include additions or losses of organic, mineral, and gaseous materials to the soil, transfers of material from one point to another within the soil, and physical and chemical transformation of mineral and organic materials within the soil. In most soils, more than one of these processes have been active in the development of horizons and many processes occur simultaneously.

Soil profiles are made up of a series of horizons that extend from the surface to the parent material. The parent material has been influenced little by the processes of soil formation. The horizons that make up a soil profile differ in one or more properties, such as color, texture, structure, consistence, porosity, and reaction.

Most profiles have four major horizons. These are the A, E, B, and C horizons. Some soils do not have E, B, or C horizons.

The A horizon is the surface layer. It is the horizon that has the maximum accumulation of organic matter. Organic matter has accumulated, partially decomposed, and been incorporated into the soil. The accumulation of organic matter in soils is greatest in and above the surface layer. Many of the more stable products of organic matter decomposition remain as finely divided materials that result in darker colors, increased water-holding and cation-exchange capacities, and granulation of the soil.

The content of organic matter in the soils in McMullen County ranges from low to medium. Czar, Clareville, and Colmena soils have accumulated sufficient organic matter to form a dark surface layer, or A horizon. Moglia, Aguilares, and Brennan soils have a low organic matter and a light surface layer, or A horizon.

The B horizon is the subsoil. It is directly below the A horizons. It is the horizon that has the maximum accumulation of dissolved or suspended materials, such as clay and iron. It may also be an altered horizon that has a distinctly different structure than that of the A horizon but shows little evidence of clay translocation or accumulation.

A B horizon that has a significant amount of clay accumulation is called a Bt horizon. Clay accumulates in horizons largely because of translocation from upper to lower horizons. As water moves downward, it can carry small amounts of clay in suspension. This clay accumulates at depths penetrated by water. It accumulates in fine pores in the soil and as clay films on surfaces of peds. Over long periods of time, at least a few thousand years, such processes can result in distinct horizons. Clareville, Coy, and Weesatche soils are examples of soils that have strongly developed Bt horizons. Salco and Pernitas soils have a less developed Bt horizon. Monwebb soils have clays with a high degree of shrink-swell, which destroys the clay films.

In McMullen County, one soil, Mirasol gravelly sandy loam, has a B horizon that is cemented by secondary silica (Bqm horizon). The source of the silica was the volcanic material deposited about 20 million years before present times. Over time the silica moved down through the soil profile and eventually cemented into the duripan found today.

A B horizon that has distinct structure or color development with little or no evidence of clay accumulation is called a Bw horizon. Plant roots and other organisms contribute to the rearrangement of soil materials into secondary aggregates. Organic residues and secretions of organisms serve as cementing agents that help stabilize structural aggregates. Soils that have appreciable amounts of clay develop structural aggregates because of drying and wetting and because of shrinking and swelling.

Some soils in McMullen County have a high content of clay that has montmorillonite (smectite) as the dominant clay mineral. These soils shrink and develop wide, deep cracks when dry and swell and become very plastic and cohesive when wet. Because of overburden pressure, soil movement, and stress caused by wetting and drying, a platy and wedge-like structure can form in the Bss horizon. Individual structural aggregates have distinct cleavage planes and polished faces known as slickensides. When the soil is dry, soil material from the surface often falls into the wide, deep cracks or is washed into the cracks by rain. When the soil is wet, lateral pressure caused by the swelling can result in surface heaving, which eventually leads to the formation of gilgai microrelief that consists of microhighs and microlows. Monwebb, Cochina, and Coquat soils have Bss horizons that have slickensides. They have gilgai microrelief.

Another important process in soil formation is the loss of components from the soil. Water can leach many soluble components, such as calcium carbonate, to the lower horizons in the profile. A horizon that has a significant accumulation of calcium carbonate is designated by the addition of the symbol "k." Weesatche, Pernitas, Benavides, Leoncita, and Salco are examples of soils that have accumulations of calcium carbonate in the lower horizons.

The C horizon is relatively unchanged by soil-forming processes, although in some places it is modified by weathering. In McMullen County a Cd horizon was used to describe densic layers in soil substratum’s that were not cemented by slice or iron. Densic horizons act like rock restricting root growth and water and air movement. Soils with a Cd horizon include Dosrios, Esseville, and Annarose.

Surface Geology

McMullen County is located on an inland dissected Coastal Plain. All of the geologic formations that crop out in McMullen County are from the Cenozoic Era. (UT-BEG, Crystal City-Eagle Pass, 1976) The age of geologic material in McMullen County ranges from Quaternary (Holocene/Recent) age material to Tertiary (Eocene) material. The oldest (Yegua Formation) material is found in the northwestern portion of the county. The youngest (Holocene age) sediments are found along the Nueces and Frio River corridors and in channels along intermittent creeks and streams throughout the county.

The land in McMullen County was formed by accumulating sediments from seas that once covered south Texas. These deposits were laid down in lagoon, lacustrine, and barrier island depositional environments. (UT-BEG, Austin Sheet, 1976) Ancient rivers flowing southeast into the Gulf deposited sediments over the newly formed land through deltaic and fluvial deposits. These deposits were made up of sediments that traveled across the southwest United States and were derived from many sources such as mudstones, siltstones, clay stones, volcanic ash, chert, limestone, sandstones, and shale. (UT-BEG. Austin Sheet, 1976) A combination of factors regarding these deposits such as the difference in time, the size and source of material, and the velocity and energy associated with the deposit, allow for the different geologic formations to become distinguishable from one another. The current landscape we see today is being dissected by the modern drainage system within the Nueces and Frio River watersheds.

Quaternary

Holocene

Holocene (Recent) age deposits occur in McMullen County along the Nueces River, Frio River, San Miguel Creek, Leoncita Creek, Cow Creek, Esperanza Creek, Opossum Creek, and along many other intermittent streams and tributaries.

Alluvium

Alluvial flood plain deposits dissect McMullen County, flowing from west to east toward the Gulf of Mexico. The Nueces and Frio Rivers encompass two large watersheds that make up the current drainage system for a third of the Rio Grande Plain. The variable nature of the alluvium is derived from the different source materials, but in general the alluvium has clayey texture and is grey and black in color. The youngest sediments are on flood plains mapped as the Cochina-Coquat or Cochina-Buchel general soil map units. The older alluvium found in upland drainageways is mapped in the Czar-Clareville, Alet, or Tela soil map units.

Pleistocene

Pleistocene fluviatile terrace deposits are primarily mapped adjacent to the two river systems. They contain gravel, sand, silt, and clay. They are distinguished from the adjacent formations by the level bench-like topography and lack of consolidation in the substratum. The deposits were laid unconformably in strata of various ages by streams during the Pleistocene Epoch. (Byrd, 1971) These sediments underlie the Caid-Leoncita-Brennan, the Brundage-Floresville-Colmena, and the Chacon-Caid general soil map units.

The Uvalde Gravels were deposited between the late Pliocene Epoch (Tertiary Period) (10 MYBP) and the early Pleistocene Epoch (Quaternary period) (2MYBP). (Byrd, 1971) These deposits occur on the low hills near the Nueces and Frio Rivers. Because of the erosion resistant qualities the gravels are found on modern day hills which were once the lowest portion of the landscape. The deposits are made of siliceous pebble, chert, limestone, and/or petrified wood. (UT-BEG, Crystal City-Eagle Pass, 1976) The Uvalde Gravels are made up of cobbles and gravels by definition and have a tendency to migrate down in the landscape onto lower formations. The thickness of the deposits can range from 2 to 30 feet in thickness. (UT-BEG, Crystal City-Eagle Pass, 1976) Soils formed from the Uvalde Gravels are the Hindes soil map unit.

Tertiary

Pliocene

The Goliad Formation crops out on southeastern McMullen County, between 685 and 350 feet above sea level. It forms the highest point in elevation in the county, just east of old San Diego Road on the Duval County line. It has an average thickness of at least 250 feet. (UT-BEG, Laredo Sheet, 1976) It is often characterized by a “cap rock” of indurated calcium carbonate. Fossils are rarely found. Topographically it has eroded into ridges and valleys. The stratigraphy and lithology of the Goliad Formation is variable. The formation is fluvial in origin and contains clays and sands, some cross-bedded, and conglomerates of siliceous gravels. (Renick, 1936) This variability results in a variety of soils. (Sellards, and others, 1932) These soils are believed to show evidence of reworking (during erosional periods) because their landforms are paleoterraces and their profiles are thicker than 80 inches to bedrock; petrocalcic horizons do not typically form in these soil profiles. The Goliad Formation underlies the Pernitas-Weesatche-Sarnosa general soil map unit.

One other feature associated with the Goliad Formation is the formation of a cemented calcium carbonate layer (petrocalcic horizon) in the soil. The cemented calcium carbonate (locally referred to as caliche) is a result of soil pedogenesis, and bears witness to the stability of the landscape when the soils were forming. The Olmedo soil map unit can be found in these areas.

Miocene

In McMullen County the Oakville Sandstone and Fleming Formation are not mapped separately and have a thickness of around 500 feet. It lies between the Goliad and Catahoula Formations. The formations are fluvial in origin and consist of a massive to cross bedded, calcareous, and medium to coarse-grained sandstone with beds of silt and clay. (UT-BEG, Laredo Sheet, 1976) The Fleming Formation is similar to the Oakville Sandstone except that it contains more clay. In southeastern McMullen County the Goliad Formation “oversteps the Oakville and rests unconformably on the Catahoula Formation. (Lindemann, 1963) The Oakville-Fleming Formation underlies the Pernitas-Weesatche-Sarnosa general soil map unit.

The Catahoula Formation is of early Miocene and Oligocene age, and has three members in McMullen County. They are the Chusa Tuff Member, Soledad Volcanic Conglomerate Member, and the Fant Tuff Member. Their combined thickness is around 900 feet. (UT-BEG, Crystal City-Eagle Pass, 1976) Collectively they are composed of mudstones, claystones, sandstones, and clay. (UT-BEG, Crystal City-Eagle Pass, 1976) Indurated conglomerate sandstones form “cuesta scarps” where the less indurated sandstones form “topographic highs.” (Lindemann, 1963) The combination of cuesta-forming (fig. 33) faults and ridge-creating erosional events have made the central part of McMullen County’s landscape the most undulating in the county. The Catahoula Formation underlies the Houla-Salco-Lomart general soil map units.

The Frio Formation is found west of the Catahoula Formation in McMullen County. Its average thickness is 200 feet, and consists of dark greenish-gray clay to maroon red clay with some gypsum and calcareous concretions (UT-BEG, Crystal City-Eagle Pass, 1976). The Frio Formation overlies the Dosrios-Campbellton-Esseville general soil map unit.

Eocene

The Eocene age material found in McMullen County consists of the Yegua Formation and the Jackson Group. The Yegua and Jackson Formations crop out in the northern, western, central, and southwestern portion of the county. They are essentially a piedmont, coastal alluvial fan built up by coalescing of stream levees and deltas. They are made up of gray to red clay. This material is about 350 feet thick and is mainly sandstone with some clay. The sandstone is commonly laminated and cross bedded, gray, green, or light yellowish brown. The clay is greenish gray, pink, or red, and has abundant petrified wood. The origin of these strata is a series of marine, lagoonal brackish water, near shore, and continental deposits. (Renick, 1936) Many of these alluvial sediments were infused with volcanic injecta, such as ash and obsidian flakes, which can be seen in the matrix of lighter colored parent materials. This process is also likely responsible for the extensive Zeolite (locally known as Kaline) deposit in the north central portion of the county. The Yegua and Jackson Group underlie the Montell-Esseville-Cotulla, Maverick-Cotulla, Campbellton-Whitsett, and Dosrios-Campbellton-Cotulla general soil map units.

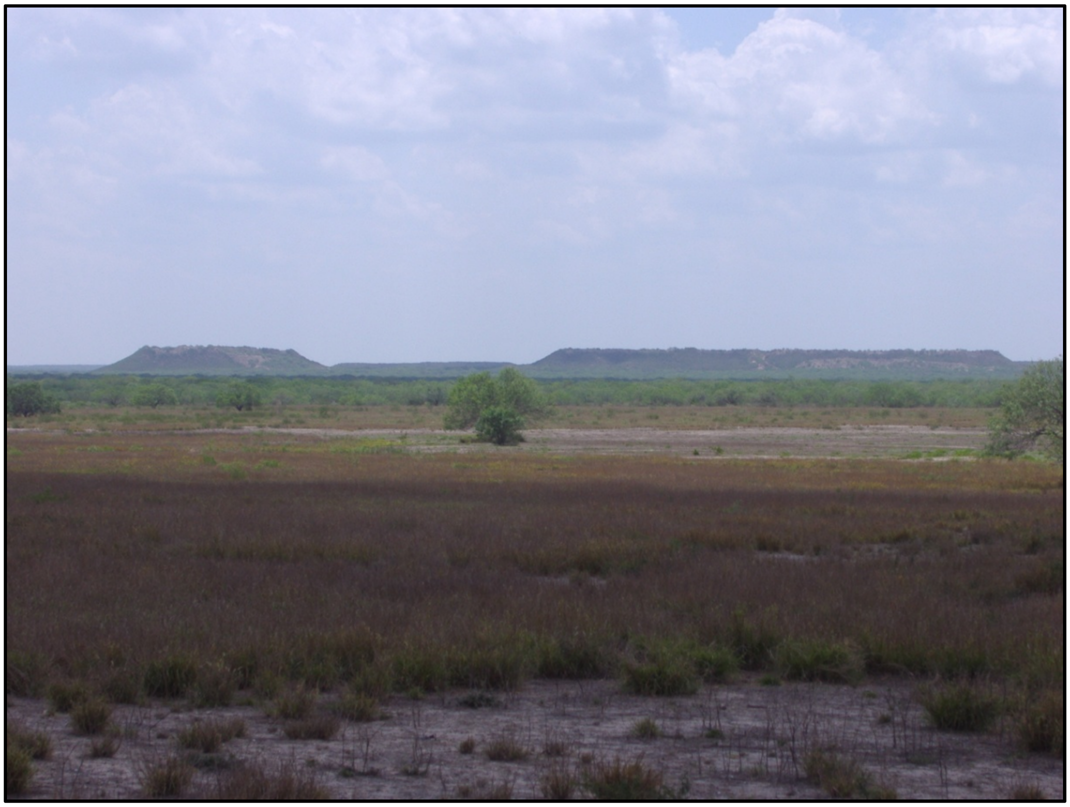

Figure 33.—Erosion remnants are common at the contact of two geologic formations. The older sediments lie underneath, as the law of superposition states. Leaving these well known landmarks the Devil’s Table and the Devils Water hole. These landforms are referred to as Cuestas or locally known as mesas.

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Glossary

Many of the terms relating to landforms, geology, and geomorphology are defined in more detail in the "National Soil Survey Handbook" (available in local offices of the Natural Resources Conservation Service or on the Internet).

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases) or both, that plant growth is restricted.

Alluvial cone. A semiconical type of alluvial fan having very steep slopes. It is higher, narrower, and steeper than a fan and is composed of coarser and thicker layers of material deposited by a combination of alluvial episodes and (to a much lesser degree) landslides (debris flow). The coarsest materials tend to be concentrated at the apex of the cone.

Alluvial fan. A low, outspread mass of loose materials and/or rock material, commonly with gentle slopes. It is shaped like an open fan or a segment of a cone. The material was deposited by a stream at the place where it issues from a narrow mountain valley or upland valley or where a tributary stream is near or at its junction with the main stream. The fan is steepest near its apex, which points upstream, and slopes gently and convexly outward (downstream) with a gradual decrease in gradient.

Alluvium. Unconsolidated material, such as gravel, sand, silt, clay, and various mixtures of these, deposited on land by running water.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction toward which a slope faces. Also called slope aspect.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Backslope. The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

Backswamp. A flood-plain landform. Extensive, marshy or swampy, depressed areas of flood plains between natural levees and valley sides or terraces.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K) expressed as a percentage of the total cation-exchange capacity.

Base slope (geomorphology). A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

Bedding plane. A planar or nearly planar bedding surface that visibly separates each successive layer of stratified sediment or rock (of the same or different lithology) from the preceding or following layer; a plane of deposition. It commonly marks a change in the circumstances of deposition and may show a parting, a color difference, a change in particle-size, or various combinations of these. The term is commonly applied to any bedding surface, even one that is conspicuously bent or deformed by folding.

Bedding system. A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Bottom land. An informal term loosely applied to various portions of a flood plain.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breaks. A landscape or tract of steep, rough or broken land dissected by ravines and gullies and marking a sudden change in topography.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Butte. An isolated, generally flat-topped hill or mountain with relatively steep slopes and talus or precipitous cliffs and characterized by summit width that is less than the height of bounding escarpments; commonly topped by a caprock of resistant material and representing an erosion remnant carved from flat-lying rocks.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Caliche. A general term for a prominent zone of secondary carbonate accumulation in surficial materials in warm, subhumid to arid areas. Caliche is formed by both geologic and pedologic processes. Finely crystalline calcium carbonate forms a nearly continuous surface-coating and void-filling medium in geologic (parent) materials. Cementation ranges from weak in nonindurated forms to very strong in indurated forms. Other minerals (e.g., carbonates, silicate, and sulfate) may occur as accessory cements. Most petrocalcic horizons and some calcic horizons are caliche.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Canyon. A long, deep, narrow valley with high, precipitous walls in an area of high local relief.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material and under similar climatic conditions but that have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Cement rock. Clayey limestone used in the manufacture of cement.

Channery soil material. Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions. See Redoximorphic features.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A dense, compact, slowly permeable subsoil layer that contains much more clay than the overlying materials, from which it is separated by a sharply defined boundary. A claypan is commonly hard when dry and plastic and sticky when wet.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

COLE (coefficient of linear extensibility). See Linear extensibility.

Colluvium. Unconsolidated, unsorted earth material being transported or deposited on side slopes and/or at the base of slopes by mass movement (e.g., direct gravitational action) and by local, unconcentrated runoff.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are compounds making up concretions. See Redoximorphic features.

Conglomerate. A coarse grained, clastic sedimentary rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue because of the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosion (geomorphology). A process of erosion whereby rocks and soil are removed or worn away by natural chemical processes, especially by the solvent action of running water, but also by other reactions, such as hydrolysis, hydration, carbonation, and oxidation.

Corrosion (soil survey interpretations). Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Crop residue management. Returning crop residue because of the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Cuesta. An asymmetric ridge capped by resistant rock layers of slight to moderate dip, commonly less than10º (approximately < 15 percent); a homocline type produced by differential erosion of interbedded resistant and weak rocks. A cuesta has a long, gentle slope on one side (dip slope), that roughly parallels the inclined beds, and on the opposite side has a relatively short, steep or cliff-like slope (scarp slope) that cuts the tilted rocks.

Cutbanks cave (in tables)**.** The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables)**.** A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Diatomaceous earth. A geologic deposit of fine, gray siliceous material composed chiefly or entirely of the remains of diatoms.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Divided-slope farming. A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained*, and *very poorly drained*. These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Drainageway. A general term for a course or channel along which water moves in draining an area. A term restricted to relatively small, linear depressions that at some time move concentrated water and either do not have a defined channel or have only a small defined channel.

Draw. A small stream valley that generally is shallower and more open than a ravine or gulch and that has a broader bottom. The present stream channel may appear inadequate to have cut the drainageway that it occupies.

Duripan. A subsoil soil horizon that is cemented by illuvial silica, usually opal or microcrystalline forms of silica, to the degree that less than 50 percent of the volume of air dry fragments will slake in water or HCl.

Earthy fill. See Mine spoil.

Ecological site. An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian deposit. Sand-, silt-, or clay-sized clastic material transported and deposited primarily by wind, commonly in the form of a dune or a sheet of sand or loess.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion surface. A land surface shaped by the action of erosion, especially by running water.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Most commonly applied to cliffs produced by differential erosion. Synonym: scarp.

Exchangeable Sodium Percentage (ESP). The percentage of cation exchange capacity of a soil occupied by sodium ions.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fan remnant. A general term for landforms that are the remaining parts of older fan landforms, such as alluvial fans, that have been either dissected or partially buried.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

Fill slope. A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

Fine textured soil. Sandy clay, silty clay, or clay.

First bottom. An obsolete, informal term loosely applied to the lowest flood-plain steps that are subject to regular flooding.

Flaggy soil material. Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. The nearly level plain that borders a stream and is subject to flooding unless protected artificially.

Flood-plain landforms. A variety of constructional and erosional features produced by stream channel migration and flooding. Examples include backswamps, flood-plain splays, meanders, meander belts, meander scrolls, oxbow lakes, and natural levees.

Flood-plain step. An essentially flat, terrace-like alluvial surface within a valley that is frequently covered by floodwater from the present stream; any approximately horizontal surface still actively modified by fluvial scour and/or deposition. May occur individually or as a series of steps.

Fluvial. Of or pertaining to rivers or streams; produced by stream or river action.

Foothills. A region of steeply sloping hills that fringes a mountain range or high-plateau escarpment. The hills have relief of as much as 1,000 feet (300 meters).

Footslope. The concave surface at the base of a hillslope. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

Forb. Any herbaceous plant not a grass or a sedge.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gilgai. Commonly, a succession of microlows (microbasins) and microhighs (microknolls) in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of clayey soils that shrink and swell considerably with changes in moisture content.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A small channel with steep sides caused by erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hard to reclaim (in tables)**.** Reclamation is difficult after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Head slope (geomorphology). A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A generic term for an elevated area of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline. Slopes are generally more than 15 percent. The distinction between a hill and a mountain is arbitrary and may depend on local usage.

Hillslope. A generic term for the steeper part of a hill between its summit and the drainage line, valley flat, or depression floor at the base of a hill.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Interfluve. A landform composed of the relatively undissected upland or ridge between two adjacent valleys containing streams flowing in the same general direction. An elevated area between two drainageways that sheds water to those drainageways.

Interfluve (geomorphology). A geomorphic component of hills consisting of the uppermost, comparatively level or gently sloping area of a hill; shoulders of backwearing hillslopes can narrow the upland or can merge, resulting in a strongly convex shape.

Intermittent stream. A stream, or reach of a stream, that does not flow year-round but that is commonly dry for 3 or more months out of 12 and whose channel is generally below the local water table. It flows only during wet periods or when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Iron depletions. See Redoximorphic features.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Knoll. A small, low, rounded hill rising above adjacent landforms.

K-sat. Saturated hydraulic conductivity. (See Permeability.)

Landslide. A general, encompassing term for most types of mass movement landforms and processes involving the downslope transport and outward deposition of soil and rock materials caused by gravitational forces; the movement may or may not involve saturated materials. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables)**.** Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Linear extensibility. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at 1/3-or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Material transported and deposited by wind and consisting dominantly of silt-sized particles.

Low strength. The soil is not strong enough to support loads.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Major Resource Area (MLRA). Major land resource areas (MLRAs) are geographically associated land resource units (LRUs). Identification of these large areas is important in statewide agricultural planning and has value in interstate, regional, and national planning.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal proportions; formed primarily under freshwater lacustrine conditions but also formed in more saline environments.

Mass movement. A generic term for the dislodgment and downslope transport of soil and rock material as a unit under direct gravitational stress.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. See Redoximorphic features.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mesa. A broad, nearly flat topped and commonly isolated landmass bounded by steep slopes or precipitous cliffs and capped by layers of resistant, nearly horizontal rocky material. The summit width is characteristically greater than the height of the bounding escarpments.

Mine spoil. An accumulation of displaced earthy material, rock, or other waste material removed during mining or excavation. Also called earthy fill.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. A kind of map unit that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common*, and *many; size—fine, medium*, and *coarse*; and *contrast—faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch)*; medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch)*;* and *coarse,* more than 15 millimeters (about 0.6 inch).

Mountain. A generic term for an elevated area of the land surface, rising more than 1,000 feet (300 meters) above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range. Mountains are formed primarily by tectonic activity and/or volcanic action but can also be formed by differential erosion.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. See Redoximorphic features.

Nose slope (geomorphology). A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent. Nose slopes consist dominantly of colluvium and slope-wash sediments (for example, slope alluvium).

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Paleoterrace. An erosional remnant of a terrace that retains the surface form and alluvial deposits of its origin but was not emplaced by, and commonly does not grade to, a present-day stream or drainage network.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan*, and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedisediment. A layer of sediment, eroded from the shoulder and backslope of an erosional slope, that lies on and is being (or was) transported across a gently sloping erosional surface at the foot of a receding hill or mountain slope.

Pedon. The smallest volume that can be called "a soil." A pedon is three-dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters) depending on the variability of the soil.

Percolation. The movement of water through the soil.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Impermeable	less than 000.0015 inch
Very slow	000.0015 to 00.06 inch
Slow	00.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

Piping (in tables)**.** Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Pitting (in tables)**.** Pits caused by melting around ice. They form on the soil after plant cover is removed.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plateau (geomorphology). A comparatively flat area of great extent and elevation; specifically, an extensive land region that is considerably elevated (more than 100 meters) above the adjacent lower lying terrain, is commonly limited on at least one side by an abrupt descent, and has a flat or nearly level surface. A comparatively large part of a plateau surface is near summit level.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Pore linings. See Redoximorphic features.

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Precipitation Effectiveness Index (PE Index) is the measure of the long-range effectiveness of precipitation in promoting plant growth for a given location. The formula for calculating PE Index is:

$$\text{P-E Index} = 10 \sum_{n-1}^{12} (\text{P-E index})_n \, .$$

The formula is equal to 10 times the sum of the monthly precipitation-evaporation ratios (monthly precipitation amounts divided by monthly evaporation amounts).

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed as pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redoximorphic concentrations. See Redoximorphic features.

Redoximorphic depletions. See Redoximorphic features.

Redoximorphic features. Redoximorphic features are associated with wetness and result from alternating periods of reduction and oxidation of iron and manganese compounds in the soil. Reduction occurs during saturation with water, and oxidation occurs when the soil is not saturated. Characteristic color patterns are created by these processes. The reduced iron and manganese ions may be removed from a soil if vertical or lateral fluxes of water occur, in which case there is no iron or manganese precipitation in that soil. Wherever the iron and manganese are oxidized and precipitated, they form either soft masses or hard concretions or nodules. Movement of iron and manganese as a result of redoximorphic processes in a soil may result in redoximorphic features that are defined as follows:

1. Redoximorphic concentrations.—These are zones of apparent accumulation of iron-manganese oxides, including:
    a. Nodules and concretions, which are cemented bodies that can be removed from the soil intact. Concretions are distinguished from nodules on the basis of internal organization. A concretion typically has concentric layers that are visible to the naked eye. Nodules do not have visible organized internal structure; and
    b. Masses, which are noncemented concentrations of substances within the soil matrix; and
    c. Pore linings, i.e., zones of accumulation along pores that may be either coatings on pore surfaces or impregnations from the matrix adjacent to the pores.
2. Redoximorphic depletions.—These are zones of low chroma (chromas less than those in the matrix) where either iron-manganese oxides alone or both iron-manganese oxides and clay have been stripped out, including:
    a. Iron depletions, i.e., zones that contain low amounts of iron and manganese oxides but have a clay content similar to that of the adjacent matrix; and
    b. Clay depletions, i.e., zones that contain low amounts of iron, manganese, and clay (often referred to as silt coatings or skeletans).
3. Reduced matrix.—This is a soil matrix that has low chroma *in situ* but undergoes a change in hue or chroma within 30 minutes after the soil material has been exposed to air.

Reduced matrix. See Redoximorphic features.

Regolith. All unconsolidated earth materials above the solid bedrock. It includes material weathered in place from all kinds of bedrock and alluvial, glacial, eolian, lacustrine, and pyroclastic deposits.

Relief. The relative difference in elevation between the upland summits and the lowlands or valleys of a given region.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as bedrock disintegrated in place.

Rill. A very small, steep-sided channel resulting from erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. A rill generally is not an obstacle to wheeled vehicles and is shallow enough to be smoothed over by ordinary tillage.

Riser. The vertical or steep side slope (e.g., escarpment) of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural, steplike landforms, such as successive stream terraces.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Saturated hydraulic conductivity (K-sat). See Permeability.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Sedimentary rock. A consolidated deposit of clastic particles, chemical precipitates, or organic remains accumulated at or near the surface of the earth under normal low temperature and pressure conditions. Sedimentary rocks include consolidated equivalents of alluvium, colluvium, drift, and eolian, lacustrine, and marine deposits. Examples are sandstone, siltstone, mudstone, claystone, shale, conglomerate, limestone, dolomite, and coal.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock that formed by the hardening of a deposit of clay, silty clay, or silty clay loam and that has a tendency to split into thin layers.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shoulder. The convex, erosional surface near the top of a hillslope. A shoulder is a transition from summit to backslope.

Shrink-swell (in tables)**.** The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Side slope (geomorphology). A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel. Side slopes are dominantly colluvium and slope-wash sediments.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Indurated silt having the texture and composition of shale but lacking its fine lamination or fissility; a massive mudstone in which silt predominates over clay.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A closed, circular or elliptical depression, commonly funnel shaped, characterized by subsurface drainage and formed either by dissolution of the surface of underlying bedrock (e.g., limestone, gypsum, or salt) or by collapse of underlying caves within bedrock. Complexes of sinkholes in carbonate-rock terrain are the main components of karst topography.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slickensides (pedogenic). Grooved, striated, and/or glossy (shiny) slip faces on structural peds, such as wedges; produced by shrink-swell processes, most commonly in soils that have a high content of expansive clays.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Nearly level	0 to 1 percent
Very gently sloping	1 to 3 percent
Gently sloping	3 to 5 percent
Moderately sloping	5 to 8 percent
Strongly sloping	8 to 12 percent
Moderately steep	12 to 20 percent
Steep	20 to 45 percent
Very steep	45 percent and higher

Slope alluvium. Sediment gradually transported down the slopes of mountains or hills primarily by nonchannel alluvial processes (i.e., slope-wash processes) and characterized by particle sorting. Lateral particle sorting is evident on long slopes. In a profile sequence, sediments may be distinguished by differences in size and/or specific gravity of rock fragments and may be separated by stone lines. Burnished peds and sorting of rounded or subrounded pebbles or cobbles distinguish these materials from unsorted colluvial deposits.

Slow refill (in tables)**.** The slow filling of ponds, resulting from restricted permeability in the soil.

Sodic (alkali) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases) or both, that plant growth is restricted.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^+ to $Ca^{++} + Mg^{++}$. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Sodium adsorption ratio (SAR). A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief and by the passage of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stone line. In a vertical cross section, a line formed by scattered fragments or a discrete layer of angular and subangular rock fragments (commonly a gravel-or cobble-sized lag concentration) that formerly was draped across a topographic surface and was later buried by additional sediments. A stone line generally caps material that was subject to weathering, soil formation, and erosion before burial. Many stone lines seem to be buried erosion pavements, originally formed by sheet and rill erosion across the land surface.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Strath terrace. A type of stream terrace; formed as an erosional surface cut on bedrock and thinly mantled with stream deposits (alluvium).

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel, originally formed near the level of the stream; represents the remnants of an abandoned flood plain, stream bed, or valley floor produced during a former state of fluvial erosion or deposition.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated) *prismatic* (vertical axis of aggregates longer than horizontal) *columnar* (prisms with rounded tops) *blocky* (angular or subangular) and *granular*. *Structureless soils are either single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. See Underlying material.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Summit. The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Terrace (conservation). An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geomorphology). A steplike surface, bordering a valley floor or shoreline that represents the former position of a flood plain, lake, or seashore. The term is usually applied both to the relatively flat summit surface (tread) that was cut or built by stream or wave action and to the steeper descending slope (scarp or riser) that has graded to a lower base level of erosion.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables)**.** Otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Tread. The flat to gently sloping, topmost, laterally extensive slope of terraces, floodplain steps, or other stepped landforms; commonly a recurring part of a series of natural steplike landforms, such as successive stream terraces.

Upland. An informal, general term for the higher ground of a region, in contrast with a low-lying adjacent area, such as a valley or plain, or for land at a higher elevation than the flood plain or low stream terrace; land above the footslope zone of the hillslope continuum.

Underlying material. The part of the soil below the solum.

Valley fill. The unconsolidated sediment deposited by any agent (water, wind, ice, or mass wasting) so as to fill or partly fill a valley.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Weathering. All physical disintegration, chemical decomposition, and biologically induced changes in rocks or other deposits at or near the earth's surface by atmospheric or biologic agents or by circulating surface waters but involving essentially no transport of the altered material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

Table 1.--Temperature and Precipitation

(Recorded for the period 1971-2000 at Tilden, Texas)

Month	Temperature (Degrees F)						Precipitation (Inches)			
				2 years in 10 will have		Average number of growing degree days*		2 years in 10 will have		Average number of days w/0.1 or more
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than	Minimum temperature less than		Average	less than	more than	
January	65.8	40.7	53.3	87	21	180	1.15	0.31	2.02	2
February	70.6	44.8	57.7	92	24	252	1.27	0.31	2.11	2
March	78.4	52.1	65.3	97	29	474	1.35	0.31	2.34	2
April	84.3	58.6	71.4	101	38	634	1.95	0.40	3.46	3
May	90.0	66.7	78.3	104	51	869	3.10	0.74	5.32	4
June	95.3	71.4	83.3	105	60	988	3.17	0.65	6.05	4
July	98.1	72.9	85.5	106	65	1,086	1.51	0.20	2.28	2
August	98.3	72.5	85.4	105	66	1,094	2.54	0.63	4.28	3
September	93.4	68.4	80.9	103	49	916	2.76	0.97	4.42	3
October	85.5	59.5	72.5	99	38	696	2.13	0.39	3.79	3
November	75.1	50.4	62.8	93	28	388	1.30	0.12	2.56	2
December	67.9	43.0	55.4	88	19	218	1.20	0.19	1.80	2
Yearly:										
Average	83.6	58.4	71.0	---	---	---	---	---	---	---
Extreme	113	5	---	108	17	---	---	---	---	---
Total	---	---	---	---	---	7,797	23.42	16.16	28.29	32

*A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area. (Threshold: 50.0 degrees F)

Table 2.--Freeze Dates in Spring and Fall

(Recorded for the period 1971-2000 at Tilden, Texas)

Probability	Temperature		
	24˚F or lower	28˚F or lower	32˚F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	February 16	March 1	March 19
2 years in 10 later than--	February 3	February 17	March 10
5 years in 10 later than--	December 2	December 21	February 22
First freezing temperature in fall:			
1 year in 10 earlier than--	December 3	November 17	November 12
2 years in 10 earlier than--	December 17	November 30	November 18
5 years in 10 earlier than--	January 24	December 28	November 30

Table 3.--Growing Season

(Recorded for the period 1971-2000 at Tilden, Texas)

Probability	Daily Minimum Temperature		
	Number of days higher than 24˚F	Number of days higher than 28˚F	Number of days higher than 32˚F
	Days	Days	Days
9 years in 10	312	282	249
8 years in 10	330	299	260
5 years in 10	>365	343	281
2 years in 10	>365	>365	302
1 year in 10	>365	>365	313

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
AgB	Aguilares fine sandy loam, 0 to 3 percent slopes	5,919	0.8
AlB	Alet sandy clay loam, 0 to 2 percent slopes, flooded	4,136	0.6
AnC	Annarose fine sandy loam, 2 to 5 percent slopes	2,815	0.4
ANS	Area not surveyed	102,366	13.7
BeC	Benavides fine sandy loam, 2 to 5 percent slopes	2,174	0.3
BkB	Bookout clay loam, 0 to 2 percent slopes	200	*
BnB	Brennan fine sandy loam, 0 to 3 percent slopes	5,957	0.8
BrB	Brundage fine sandy loam, 0 to 2 percent slopes	18,237	2.4
BsB	Brystal fine sandy loam, 0 to 3 percent slopes	4,501	0.6
BuA	Buchel clay, 0 to 1 percent slopes, occasionally flooded	4,401	0.6
BzA	Buchel clay, 0 to 1 percent slopes, frequently flooded	3,194	0.4
CaB	Caid sandy clay loam, 0 to 3 percent slopes	11,271	1.5
CbB	Campbellton clay loam, 1 to 3 percent slopes	20,614	2.8
CcB	Catarina clay, 0 to 2 percent slopes	728	*
ChB	Chacon sandy clay loam, 0 to 2 percent slopes	7,468	1.0
CkB	Choke silty clay loam, 1 to 3 percent slopes	883	0.1
ClA	Cochina clay, 0 to 1 percent slopes, occasionally flooded	32,417	4.4
CmA	Cochina clay, 0 to 1 percent slopes, frequently flooded	24,058	3.2
CnB	Colmena fine sandy loam, 0 to 3 percent slopes	10,101	1.4
CoB	Conquista clay, 1 to 3 percent slopes	931	0.1
CpC	Copita sandy clay loam, 1 to 5 percent slopes	3,339	0.4
CtA	Coquat clay, 0 to 1 percent slopes, frequently flooded	1,721	0.2
CuB	Cotulla clay loam, 0 to 3 percent slopes	8,699	1.2
CVB	Cotulla-Maverick complex, 1 to 3 percent slopes	4,407	0.6
CyB	Coy clay loam, 1 to 3 percent slopes	14,684	2.0
CZB	Czar-Clareville complex, 0 to 2 percent slopes, rarely flooded	21,825	2.9
DAM	Dams	72	*
DsB	Dosrios clay, 1 to 3 percent slopes	24,282	3.3
EsB	Eloso clay, 0 to 3 percent slopes	3,316	0.4
EvC	Esseville clay, 1 to 5 percent slopes	28,756	3.9
FaC	Fashing clay, 1 to 5 percent slopes	6,721	0.9
FoB	Floresville fine sandy loam, 0 to 3 percent slopes	3,368	0.5
HnC	Hindes very gravelly sandy clay loam, 1 to 5 percent slopes	8,388	1.1
HoB	Houla clay loam, 1 to 3 percent slopes	60,850	8.2
ImB	Imogene fine sandy loam, 0 to 2 percent slopes, occasionally flooded	8,127	1.1
LaB	Laparita clay loam, 0 to 3 percent slopes, rarely flooded	26,249	3.5
LeB	Lasalle clay, 1 to 3 percent slopes	324	*
LnB	Leoncita fine sandy loam, 1 to 3 percent slopes	12,775	1.7
LoC	Lomart loam, 1 to 5 percent slopes	5,510	0.7
MaD	Mata very gravelly sandy clay loam, 1 to 8 percent slopes	5,059	0.7
McC	Maverick clay, 2 to 5 percent slopes	8,812	1.2
MgD	Mirasol gravelly sandy loam, 1 to 8 percent slopes	2,304	0.3
MoC	Moglia sandy clay loam, 1 to 5 percent slopes	11,746	1.6
MtB	Montell clay, 0 to 3 percent slopes	33,411	4.5
MwA	Monwebb clay, 0 to 1 percent slopes, occasionally flooded	24,359	3.3
OmD	Olmedo very gravelly loam, 1 to 8 percent slopes	382	*
PIT	Pits, 1 to 5 percent slopes	707	*
PkC	Pavelek clay loam, 3 to 5 percent slopes, severely eroded	497	*
PrC	Pernitas fine sandy loam, 1 to 5 percent slopes	2,530	0.3
PtC	Pernitas sandy clay loam, 1 to 5 percent slopes	20,985	2.8
RNB	Rhymes-Nusil complex, 1 to 3 percent slopes	1,674	0.2
RoB	Rosenbrock clay, 1 to 3 percent slopes	1,830	0.2
SaB	Salco fine sandy loam, 1 to 3 percent slopes	34,976	4.7
ScD	Sancajo very gravelly loam, 1 to 8 percent slopes	2,724	0.4
SrC	Sarnosa fine sandy loam, 2 to 5 percent slopes	1,528	0.2
StB	Sinton sandy clay loam, 0 to 2 percent slopes, frequently flooded	3,471	0.5
TaB	Tela sandy clay loam, 0 to 2 percent slopes, flooded	17,488	2.3
ToB	Tordia clay, 0 to 3 percent slopes	7,116	1.0
VeC	Verick fine sandy loam, 1 to 5 percent slopes	1,032	0.1
VrC	Viboras clay, 1 to 5 percent slopes	901	0.1

Table 4.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
W	Water	12,944	1.7
WbB	Webb very fine sandy loam, 1 to 3 percent slopes	790	0.1
WeB	Weesatche fine sandy loam, 0 to 3 percent slopes	16,236	2.2
WeC	Weesatche fine sandy loam, 3 to 5 percent slopes	1,599	0.2
WgC	Weigang fine sandy loam, 1 to 5 percent slopes	6,304	0.8
WhC	Whitsett fine sandy loam, 1 to 5 percent slopes	4,456	0.6
WPD	Whitsett-Picosa complex, 1 to 8 percent slopes	6,348	0.9
ZaB	Zavala fine sandy loam, 0 to 2 percent slopes, flooded	3,525	0.5
ZvC	Zavco sandy clay loam, 1 to 5 percent slopes	3,583	0.5
	Total	745,101	100.0

* Less than 0.1 percent.

Table 5.--Prime and Other Important Farmland

(Only the soils considered prime or important farmland are listed. Urban or built-up areas of the soils listed are not considered prime or important farmland. If a soil is prime or important farmland only under certain conditions, the conditions are specified in parentheses after the soil name.)

Map symbol	Map unit name	Farmland Classification
CkB	Choke silty clay loam, 1 to 3 percent slopes	All areas are prime farmland
AlB	Alet sandy clay loam, 0 to 2 percent slopes, flooded	Prime farmland if irrigated
AnC	Annarose fine sandy loam, 2 to 5 percent slopes	Prime farmland if irrigated
BeC	Benavides fine sandy loam, 2 to 5 percent slopes	Prime farmland if irrigated
BkB	Bookout clay loam, 0 to 2 percent slopes	Prime farmland if irrigated
BsB	Brystal fine sandy loam, 0 to 3 percent slopes	Prime farmland if irrigated
BuA	Buchel clay, 0 to 1 percent slopes, occasionally flooded	Prime farmland if irrigated
CaB	Caid sandy clay loam, 0 to 3 percent slopes	Prime farmland if irrigated
ClA	Cochina clay, 0 to 1 percent slopes, occasionally flooded	Prime farmland if irrigated
CyB	Coy clay loam, 1 to 3 percent slopes	Prime farmland if irrigated
CZB	Czar-Clareville complex, 0 to 2 percent slopes, rarely flooded	Prime farmland if irrigated
FoB	Floresville fine sandy loam, 0 to 3 percent slopes	Prime farmland if irrigated
LnB	Leoncita fine sandy loam, 1 to 3 percent slopes	Prime farmland if irrigated
PtC	Pernitas sandy clay loam, 1 to 5 percent slopes	Prime farmland if irrigated
SaB	Salco fine sandy loam, 1 to 3 percent slopes	Prime farmland if irrigated
ToB	Tordia clay, 0 to 3 percent slopes	Prime farmland if irrigated
WbB	Webb very fine sandy loam, 1 to 3 percent slopes	Prime farmland if irrigated
ZvC	Zavco sandy clay loam, 1 to 5 percent slopes	Prime farmland if irrigated

Table 6.--Irrigated and Nonirrigated Yields by Map Unit

(Yields in the "N" columns are for nonirrigated areas; those in the "I" columns are for irrigated areas. Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil.)

Map symbol and soil name	Land capability		Buffel grass		Grain sorghum		Improved bermudagrass	
	N	I	N	I	N	I	N	I
			AUM	AUM	Bu	Bu	AUM	AUM
AgB:			---	---	---	---	---	---
Aguilares	4e	2e						
AlB:			---	---	---	---	---	---
Alet, occasionally flooded	2e	1						
Alet, frequently flooded	2e	1						
AnC:			---	---	---	---	---	---
Annarose	3e	---						
ANS:			---	---	---	---	---	---
Area not surveyed	---	---						
BeC:			---	---	---	---	---	---
Benavides	3e	---						
BkB:			---	---	30.00	95.00	---	10.00
Bookout	3c	1						
BnB:			---	---	40.00	90.00	3.00	12.00
Brennan	3c	---						
BrB:			---	---	---	---	---	---
Brundage	6s	3e						
BsB:			---	---	30.00	85.00	2.50	10.00
Brystal	3e	2e						
BuA:			---	---	55.00	---	5.50	---
Buchel, occasionally flooded	2w	---						
BzA:			---	---	---	---	5.00	---
Buchel, frequently flooded	3w	---						
CaB:			---	---	30.00	100.00	2.50	10.00
Caid	3e	2e						
CbB:			---	---	40.00	100.00	---	---
Campbellton	2e	2e						
CcB:			---	---	---	---	---	---
Catarina	6s	---						
ChB:			---	---	40.00	110.00	---	---
Chacon	4c	2s						
CkB:			3.00	---	40.00	---	3.00	---
Choke	3e	---						

Table 6.--Irrigated and Nonirrigated Yields by Map Unit--Continued

Map symbol and soil name	Land capability		Buffel grass		Grain sorghum		Improved bermudagrass	
	N	I	N	I	N	I	N	I
			AUM	AUM	Bu	Bu	AUM	AUM
ClA:			---	---	30.00	90.00	---	---
Cochina, occasionally flooded	3w	3w						
CmA:			---	---	30.00	90.00	---	---
Cochina, frequently flooded	4w	4w						
CnB:			---	---	50.00	---	---	---
Colmena	2e	---						
CoB:			---	---	---	---	4.00	---
Conquista	4e	---						
CpC:			---	---	---	---	---	---
Copita	6e	---						
CtA:			---	---	---	---	---	---
Coquat, frequently flooded	6s	---						
CuB:			---	---	35.00	80.00	---	---
Cotulla	4s	3s						
CVB:			---	---	35.00	80.00	---	---
Cotulla	4s	3s						
Maverick	6e	4s						
CyB:			---	---	---	---	---	---
Coy	2e	2e						
CZB:			---	---	---	---	---	---
Czar	2c	---						
Clareville, rarely flooded	2e	---						
DAM:			---	---	---	---	---	---
Dams	---	---						
DsB:			---	---	50.00	110.00	3.00	12.00
Dosrios	3s	3e						
EsB:			---	---	30.00	---	2.50	---
Eloso	3e	---						
EvC:			---	---	35.00	75.00	2.50	10.00
Esseville	2e	---						
FaC:			---	---	35.00	80.00	2.50	10.00
Fashing	4e	3e						
FoB:			---	---	40.00	---	2.00	7.00
Floresville, eroded	4e	---						
HnC:			---	---	---	---	---	---
Hindes	6s	6s						

Table 6.--Irrigated and Nonirrigated Yields by Map Unit--Continued

Map symbol and soil name	Land capability		Buffel grass		Grain sorghum		Improved bermudagrass	
	N	I	N	I	N	I	N	I
			AUM	AUM	Bu	Bu	AUM	AUM
HoB:			---	---	---	---	---	---
Houla	3s	---						
ImB:			---	---	25.00	60.00	---	---
Imogene, occasionally flooded	4s	3s						
LaB:			---	---	30.00	65.00	3.00	12.00
Laparita, rarely flooded	3e	3e						
LeB:			---	---	35.00	80.00	---	---
Lasalle	4e	4e						
LnB:			---	---	25.00	90.00	---	10.00
Leoncita	3e	3e						
LoC:			---	---	---	---	2.00	---
Lomart	6e	---						
MaD:			---	---	---	---	2.00	---
Mata	4s	---						
McC:			---	---	---	---	---	---
Maverick	6e	4s						
MgD:			1.50	---	---	---	2.00	---
Mirasol	7s	---						
MoC:			---	---	---	---	---	---
Moglia	6e	---						
MtB:			---	---	---	---	---	10.00
Montell	6s	3e						
MwA:			---	---	---	100.00	---	10.00
Monwebb, occasionally flooded	4s	---						
OmD:			---	---	---	---	---	---
Olmedo	7s	---						
PIT:			---	---	---	---	---	---
Pits	---	---						
PkC:			---	---	---	---	---	---
Pavelek, severely eroded	6e	---						
PrC:			---	---	35.00	---	2.50	---
Pernitas	2e	---						
PtC:			---	---	35.00	---	2.50	---
Pernitas	2e	---						
RNB:			---	---	---	---	3.00	12.00
Rhymes	6e	4e						
Nusil	4e	3e						

Table 6.--Irrigated and Nonirrigated Yields by Map Unit--Continued

Map symbol and soil name	Land capability		Buffel grass		Grain sorghum		Improved bermudagrass	
	N	I	N	I	N	I	N	I
			AUM	AUM	Bu	Bu	AUM	AUM
RoB:			---	---	65.00	---	5.00	---
Rosenbrock---------------	2e	---						
SaB:			3.00	---	---	---	3.00	---
Salco--------------------	2s	---						
ScD:			---	---	---	---	---	---
Sancajo------------------	7s	---						
SrC:			---	---	45.00	---	5.00	---
Sarnosa------------------	4e	---						
StB:			---	---	---	---	6.00	---
Sinton, frequently flooded-----------------	3w	3w						
TaB:			6.00	---	---	---	6.00	---
Tela, occasionally flooded-----------------	2w	---						
Tela, frequently Flooded-----------------	3w	---						
ToB:			---	---	60.00	95.00	6.00	10.00
Tordia-------------------	3e	2e						
VeC:			---	---	---	---	2.00	8.00
Verick-------------------	6e	3e						
VrC:			---	---	---	---	---	---
Viboras------------------	5s	---						
W:			---	---	---	---	---	---
Water--------------------	---	---						
WbB:			---	---	35.00	85.00	2.50	9.00
Webb---------------------	3e	2e						
WeB:			---	---	50.00	---	5.50	---
Weesatche----------------	3e	---						
WeC:			---	---	50.00	---	5.50	---
Weesatche----------------	3e	---						
WgC:			---	---	---	---	2.50	---
Weigang------------------	6e	---						
WhC:			---	---	---	---	2.50	---
Whitsett-----------------	2e	---						
WPD:			---	---	---	---	2.00	6.00
Whitsett-----------------	3e	---						
Picosa-------------------	7s	2s						
ZaB:			---	---	---	---	4.00	---
Zavala, frequently flooded-----------------	3w	---						
Zavala, occasionally flooded-----------------	2w	---						

Table 6.--Irrigated and Nonirrigated Yields by Map Unit--Continued

Map symbol and soil name	Land capability		Buffel grass		Grain sorghum		Improved bermudagrass	
	N	I	N	I	N	I	N	I
			AUM	AUM	Bu	Bu	AUM	AUM
ZvC:			---	---	25.00	---	2.00	---
Zavco	4e	---						

Table 7.--Rangeland Productivity

(Only the soils that support rangeland vegetation suitable for grazing are rated.)

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb/acre	Lb/acre	Lb/acre
AgB:				
Aguilares	Gray Loamy Upland 18-25" PZ	3,600	3,000	1,600
AlB:				
Alet, occasionally flooded	Loamy Bottomland 20-35" PZ	4,000	3,000	2,000
Alet, frequently flooded	Loamy Bottomland 20-35" PZ	4,000	3,000	2,000
AnC:				
Annarose	Gray Sandy Loam 20-25" PZ	4,000	3,000	2,000
BeC:				
Benavides	Gray Sandy Loam 20-25" PZ	4,000	3,000	2,000
BkB:				
Bookout	Clay Loam 20-25" PZ	3,800	3,000	2,000
BnB:				
Brennan	Sandy Loam 25-35" PZ	4,400	3,600	2,200
BrB:				
Brundage	Claypan Prairie 18-25" PZ	3,000	2,500	1,500
BsB:				
Brystal	Sandy Loam 18-25" PZ	4,000	3,500	2,200
BuA:				
Buchel, occasionally flooded	Clayey Bottomland 20-35" PZ	5,000	4,000	3,000
BzA:				
Buchel, frequently flooded	Clayey Bottomland 20-35" PZ	5,000	4,000	3,000
CaB:				
Caid	Gray Sandy Loam 18-25" PZ	3,800	3,200	2,000
CbB:				
Campbellton	Saline Clay Loam 22-35" PZ	3,600	2,700	1,800
CcB:				
Catarina	Saline Clay 18-25" PZ	3,000	2,300	1,500
ChB:				
Chacon	Clay Loam 18-25" PZ	3,800	3,000	1,900
CkB:				
Choke	Gray Sandy Loam 18-25" PZ	4,000	3,000	2,000
ClA:				
Cochina, occasionally flooded	Clayey Bottomland 18-35" PZ	4,400	3,100	1,900
CmA:				
Cochina, frequently flooded	Clayey Bottomland 18-35" PZ	4,400	3,100	1,900
CnB:				
Colmena	Sandy Loam 25-35" PZ	4,400	3,600	2,200
CpC:				
Copita	Gray Sandy Loam 18-25" PZ	3,600	2,800	1,400

Table 7.--Rangeland Productivity--Continued

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb/acre	Lb/acre	Lb/acre
CtA:				
Coquat, frequently flooded	Lowland 22-35" PZ	11,000	9,000	7,000
CuB:				
Cotulla	Saline Clay 18-25" PZ	3,500	2,800	1,400
CVB:				
Cotulla	Saline Clay 18-25" PZ	3,500	2,800	1,400
Maverick	Rolling Hardland 18-25" PZ	2,700	2,000	1,000
CyB:				
Coy	Clay Loam 20-25" PZ	4,000	3,500	2,500
CZB:				
Czar	Sandy Loam 25-35" PZ	5,800	5,000	3,000
Clareville, rarely flooded	Clay Loam 25-35" PZ	4,000	3,000	2,000
DsB:				
Dosrios	Saline Clay 18-25" PZ	4,000	3,500	2,500
EsB:				
Eloso	Rolling Blackland 25-35" PZ	4,200	3,200	2,000
EvC:				
Esseville	Saline Clay 18-25" PZ	3,500	3,000	2,000
FaC:				
Fashing	Shallow 25-35" PZ	2,500	2,000	1,500
FoB:				
Floresville, eroded	Tight Sandy Loam 20-25" PZ	3,800	3,100	1,900
HnC:				
Hindes	Gravelly Ridge 20-35" PZ	3,000	1,800	1,000
HoB:				
Houla	Gray Sandy Loam 20-25" PZ	4,000	3,000	2,000
ImB:				
Imogene, occasionally flooded	Tight Sandy Loam 20-25" PZ	4,000	3,200	1,800
LaB:				
Laparita, rarely flooded	Claypan Prairie 20-25" PZ	3,000	2,500	1,500
LeB:				
Lasalle	Saline Clay 18-25" PZ	3,500	2,800	1,400
LnB:				
Leoncita	Gray Sandy Loam 18-25" PZ	4,500	3,500	2,500
LoC:				
Lomart	Shallow Sandy Loam 20-30" PZ	2,700	1,800	1,000
MaD:				
Mata	Gravelly Ridge 18-35" PZ	2,800	2,300	1,000
McC:				
Maverick	Rolling Hardland 18-25" PZ	2,700	2,000	1,000

Table 7.--Rangeland Productivity--Continued

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb/acre	Lb/acre	Lb/acre
MgD:				
Mirasol	Shallow Ridge 20-25" PZ	3,500	2,300	1,000
MoC:				
Moglia	Saline Clay Loam 18-35" PZ	3,600	2,700	1,500
MtB:				
Montell	Clay Flat 18-25" PZ	4,000	3,000	1,500
MwA:				
Monwebb, occasionally flooded	Clay Flat 18-25" PZ	4,000	3,000	1,500
OmD:				
Olmedo	Shallow Ridge 20-25" PZ	2,700	1,800	1,000
PkC:				
Pavelek, severely eroded	Shallow Ridge 20-32" PZ	3,000	2,000	1,200
PrC:				
Pernitas	Gray Sandy Loam 20-25" PZ	4,000	3,000	2,000
PtC:				
Pernitas	Gray Sandy Loam 20-25" PZ	4,000	3,000	2,000
RNB:				
Rhymes	Sandy 20-35" PZ	5,000	4,000	2,000
Nusil	Sandy 20-35" PZ	5,000	4,000	2,500
RoB:				
Rosenbrock	Rolling Blackland 25-35" PZ	4,200	3,200	2,000
SaB:				
Salco	Gray Loamy Upland 20-25" PZ	3,400	2,500	1,000
ScD:				
Sancajo	Shallow Ridge 20-25" PZ	2,700	1,800	1,000
SrC:				
Sarnosa	Gray Sandy Loam 20-25" PZ	4,500	3,500	2,500
StB:				
Sinton, frequently flooded	Loamy Bottomland 20-35" PZ	7,000	6,000	4,000
TaB:				
Tela, occasionally flooded	Ramadero 20-25" PZ	6,000	4,500	2,500
Tela, frequently flooded	Ramadero 20-25" PZ	6,000	4,500	2,500
ToB:				
Tordia	Rolling Blackland 25-35" PZ	4,000	3,500	2,500
VeC:				
Verick	Shallow Sandy Loam 18-25" PZ	2,800	1,800	1,200
VrC:				
Viboras	Saline Clay 18-25" PZ	3,000	2,500	1,500
WbB:				
Webb	Tight Sandy Loam 20-25" PZ	3,500	2,800	2,000

Table 7.--Rangeland Productivity--Continued

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb/acre	Lb/acre	Lb/acre
WeB:				
Weesatche	Sandy Loam 25-35" PZ	4,000	3,000	2,000
WeC:				
Weesatche	Sandy Loam 25-35" PZ	4,000	3,000	2,000
WgC:				
Weigang	Shallow 25-35" PZ	2,500	2,000	1,500
WhC:				
Whitsett	Shallow 18-25" PZ	2,500	2,000	1,500
WPD:				
Whitsett	Shallow 25-35" PZ	2,500	2,000	1,500
Picosa	Shallow Ridge 20-32" PZ	2,500	2,000	1,000
ZaB:				
Zavala, frequently flooded	Loamy Bottomland 25-35" PZ	7,000	5,000	2,000
Zavala, occasionally flooded	Loamy Bottomland 25-35" PZ	7,000	5,000	2,000
ZvC:				
Zavco	Clay Loam 20-25" PZ	3,500	2,750	2,000

Table 8.--Rangeland Chaining, Root Plowing, Disking, and Roller Chopping

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Rangeland Chaining		Rangeland Root Plowing		Rangeland Disking		Rangeland Roller Chopping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AgB:									
Aguilares	80	Not limited		Not limited		Not limited		Somewhat limited Droughty	 0.44
AlB:									
Alet, occasionally flooded	55	Not limited		Not limited		Not limited		Somewhat limited Droughty	 0.07
Alet, frequently flooded	20	Not limited		Very limited Flooding	 1.00	Very limited Flooding	 1.00	Somewhat limited Droughty	 0.07
AnC:									
Annarose	75	Not limited		Not limited		Not limited		Somewhat limited Droughty	 0.08
ANS:									
Area not surveyed	100	Not Rated		Not Rated		Not Rated		Not Rated	
BeC:									
Benavides	90	Not limited		Not limited		Not limited		Somewhat limited Droughty	 0.25
BkB:									
Bookout	85	Not limited		Very limited Too clayey	 1.00	Very limited Too clayey	 1.00	Not limited	
BnB:									
Brennan	70	Not limited		Not limited		Not limited		Somewhat limited Droughty	 0.25

Table 8.--Rangeland Chaining, Root Plowing, Disking, and Roller Chopping--Continued

Map symbol and soil name	Pct. of map unit	Rangeland Chaining		Rangeland Root Plowing		Rangeland Disking		Rangeland Roller Chopping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
BrB: Brundage	80	Not limited		Not limited		Not limited		Somewhat limited	
								Droughty	0.34
BsB: Brystal	80	Not limited		Not limited		Not limited		Somewhat limited	
								Droughty	0.25
BuA: Buchel, occasionally flooded	85	Not limited		Very limited		Very limited		Not limited	
				Too clayey	1.00	Too clayey	1.00		
BzA: Buchel, frequently flooded	95	Not limited		Very limited		Very limited		Not limited	
				Too clayey	1.00	Too clayey	1.00		
				Flooding	1.00	Flooding	1.00		
CaB: Caid	80	Not limited		Not limited		Not limited		Somewhat limited	
								Droughty	0.08
CbB: Campbellton	70	Not limited		Somewhat limited		Somewhat limited		Not limited	
				Too clayey	0.28	Too clayey	0.28		
CcB: Catarina	90	Not limited		Very limited		Very limited		Somewhat limited	
				Too clayey	1.00	Too clayey	1.00	Droughty	0.96
ChB: Chacon	80	Not limited		Somewhat limited		Somewhat limited		Not limited	
				Too clayey	0.03	Too clayey	0.03		

Table 8.--Rangeland Chaining, Root Plowing, Disking, and Roller Chopping--Continued

Map symbol and soil name	Pct. of map unit	Rangeland Chaining		Rangeland Root Plowing		Rangeland Disking		Rangeland Roller Chopping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CkB:									
Choke	70	Not limited		Very limited Too clayey	 1.00	Very limited Too clayey	 1.00	Not limited	
ClA:									
Cochina, occasionally flooded	90	Not limited		Very limited Too clayey	 1.00	Very limited Too clayey	 1.00	Somewhat limited Droughty	 0.76
CmA:									
Cochina, frequently flooded	90	Not limited		Very limited Too clayey Flooding	 1.00 1.00	Very limited Too clayey Flooding	 1.00 1.00	Somewhat limited Droughty	 0.76
CnB:									
Colmena	82	Not limited		Not limited		Not limited		Somewhat limited Droughty	 0.08
CoB:									
Conquista	95	Not limited		Very limited Too clayey	 1.00	Very limited Too clayey	 1.00	Not limited	
CpC:									
Copita	80	Not limited		Not limited		Not limited		Somewhat limited Droughty	 0.25
CtA:									
Coquat, frequently flooded	85	Not limited		Very limited Too clayey Flooding	 1.00 1.00	Very limited Too clayey Flooding	 1.00 1.00	Somewhat limited Droughty	 0.16

Table 8.--Rangeland Chaining, Root Plowing, Disking, and Roller Chopping--Continued

Map symbol and soil name	Pct. of map unit	Rangeland Chaining		Rangeland Root Plowing		Rangeland Disking		Rangeland Roller Chopping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CuB:									
Cotulla	70	Not limited		Very limited		Very limited		Somewhat limited	
				Too clayey	1.00	Too clayey	1.00	Droughty	0.40
CVB:									
Cotulla	70	Not limited		Very limited		Very limited		Somewhat limited	
				Too clayey	1.00	Too clayey	1.00	Droughty	0.40
Maverick	20	Not limited		Very limited		Very limited		Not limited	
				Too clayey	1.00	Too clayey	1.00		
CyB:									
Coy	90	Not limited		Very limited		Very limited		Not limited	
				Too clayey	1.00	Too clayey	1.00		
CZB:									
Czar	60	Not limited		Not limited		Not limited		Not limited	
Clareville, rarely flooded	30	Not limited		Somewhat limited		Somewhat limited		Not limited	
				Too clayey	0.50	Too clayey	0.50		
DAM:									
Dams	100	Not Rated		Not Rated		Not Rated		Not Rated	
DsB:									
Dosrios	80	Not limited		Very limited		Very limited		Not limited	
				Too clayey	1.00	Too clayey	1.00		
EsB:									
Eloso	70	Not limited		Very limited		Very limited		Not limited	
				Too clayey	1.00	Too clayey	1.00		
EvC:									
Esseville	75	Not limited		Very limited		Very limited		Not limited	
				Too clayey	1.00	Too clayey	1.00		

Table 8.--Rangeland Chaining, Root Plowing, Disking, and Roller Chopping--Continued

Map symbol and soil name	Pct. of map unit	Rangeland Chaining		Rangeland Root Plowing		Rangeland Disking		Rangeland Roller Chopping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
FaC: Fashing	90	Not limited		Very limited		Very limited		Somewhat limited	
				Too clayey	1.00	Too clayey	1.00	Droughty	0.08
				Restrictive layer	0.05	Restrictive layer	0.05		
FoB: Floresville, eroded	75	Not limited		Not limited		Not limited		Somewhat limited	
								Droughty	0.25
HnC: Hindes	85	Not limited		Very limited		Very limited		Somewhat limited	
				Too clayey	1.00	Too clayey	1.00	Droughty	0.98
HoB: Houla	66	Not limited		Somewhat limited		Somewhat limited		Not limited	
				Too clayey	0.59	Too clayey	0.59		
ImB: Imogene, occasionally flooded	80	Not limited		Not limited		Not limited		Not limited	
LaB: Laparita, rarely flooded	70	Not limited		Very limited		Very limited		Not limited	
				Too clayey	1.00	Too clayey	1.00		
LeB: Lasalle	80	Not limited		Very limited		Very limited		Somewhat limited	
				Too clayey	1.00	Too clayey	1.00	Droughty	0.18
LnB: Leoncita	85	Not limited		Not limited		Not limited		Somewhat limited	
								Droughty	0.25

Table 8.--Rangeland Chaining, Root Plowing, Disking, and Roller Chopping--Continued

Map symbol and soil name	Pct. of map unit	Rangeland Chaining		Rangeland Root Plowing		Rangeland Disking		Rangeland Roller Chopping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
LoC: Lomart	80	Not limited		Not limited		Not limited		Not limited	
MaD: Mata	91	Not limited		Somewhat limited Too clayey	 0.28	Somewhat limited Too clayey	 0.28	Somewhat limited Droughty	 0.92
McC: Maverick	80	Not limited		Very limited Too clayey	 1.00	Very limited Too clayey	 1.00	Not limited	
MgD: Mirasol	85	Not limited		Somewhat limited Restrictive layer	 0.26	Somewhat limited Restrictive layer	 0.26	Somewhat limited Droughty	 0.92
MoC: Moglia	80	Not limited		Somewhat limited Too clayey	 0.93	Somewhat limited Too clayey	 0.93	Somewhat limited Droughty	 0.08
MtB: Montell	80	Not limited		Very limited Too clayey	 1.00	Very limited Too clayey	 1.00	Not limited	
MwA: Monwebb, occasionally flooded	80	Not limited		Very limited Too clayey	 1.00	Very limited Too clayey	 1.00	Not limited	
OmD: Olmedo	90	Not limited		Very limited Large stones Restrictive layer	 1.00 0.05	Very limited Large stones Restrictive layer	 1.00 0.05	Very limited Droughty Large stones	 1.00 1.00

Table 8.--Rangeland Chaining, Root Plowing, Disking, and Roller Chopping--Continued

Map symbol and soil name	Pct. of map unit	Rangeland Chaining		Rangeland Root Plowing		Rangeland Disking		Rangeland Roller Chopping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
PIT:									
Pits	100	Not Rated		Not limited		Not limited		Very limited	
								Droughty	1.00
PkC:									
Pavelek, severely eroded	70	Not limited		Very limited		Very limited		Not limited	
				Too clayey	1.00	Too clayey	1.00		
PrC:									
Pernitas	90	Not limited		Not limited		Not limited		Somewhat limited	
								Droughty	0.08
PtC:									
Pernitas	85	Not limited		Not limited		Not limited		Somewhat limited	
								Droughty	0.08
RNB:									
Rhymes	60	Not limited		Very limited		Very limited		Very limited	
				Wind erosion	1.00	Wind erosion	1.00	Droughty	1.00
Nusil	30	Not limited		Very limited		Very limited		Very limited	
				Wind erosion	1.00	Wind erosion	1.00	Droughty	1.00
RoB:									
Rosenbrock	70	Not limited		Very limited		Very limited		Not limited	
				Too clayey	1.00	Too clayey	1.00		
SaB:									
Salco	85	Not limited		Not limited		Not limited		Not limited	
ScD:									
Sancajo	80	Not limited		Very limited		Very limited		Very limited	
				Large stones	1.00	Large stones	1.00	Droughty	1.00
								Large stones	1.00

Table 8.--Rangeland Chaining, Root Plowing, Disking, and Roller Chopping--Continued

Map symbol and soil name	Pct. of map unit	Rangeland Chaining		Rangeland Root Plowing		Rangeland Disking		Rangeland Roller Chopping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SrC:									
Sarnosa	80	Not limited		Not limited		Not limited		Somewhat limited Droughty	 0.25
StB:									
Sinton, frequently flooded	75	Not limited		Very limited Flooding	 1.00	Very limited Flooding	 1.00	Not limited	
TaB:									
Tela, occasionally flooded	70	Not limited		Not limited		Not limited		Somewhat limited Droughty	 0.25
Tela, frequently flooded	20	Not limited		Very limited Flooding	 1.00	Very limited Flooding	 1.00	Somewhat limited Droughty	 0.25
ToB:									
Tordia	90	Not limited		Very limited Too clayey	 1.00	Very limited Too clayey	 1.00	Not limited	
VeC:									
Verick	80	Not limited		Very limited Restrictive layer	 1.00	Very limited Restrictive layer	 1.00	Somewhat limited Droughty	 0.08
VrC:									
Viboras	90	Not limited		Very limited Too clayey	 1.00	Very limited Too clayey	 1.00	Somewhat limited Droughty	 0.76
W:									
Water	100	Not Rated		Not Rated		Not Rated		Not Rated	
WbB:									
Webb	85	Not limited		Not limited		Not limited		Not limited	

Table 8.--Rangeland Chaining, Root Plowing, Disking, and Roller Chopping--Continued

Map symbol and soil name	Pct. of map unit	Rangeland Chaining		Rangeland Root Plowing		Rangeland Disking		Rangeland Roller Chopping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
WeB:									
Weesatche---------	85	Not limited		Not limited		Not limited		Somewhat limited	
								Droughty	0.25
WeC:									
Weesatche---------	86	Not limited		Not limited		Not limited		Somewhat limited	
								Droughty	0.25
WgC:									
Weigang-----------	87	Not limited		Somewhat limited		Somewhat limited		Somewhat limited	
				Restrictive layer	0.03	Restrictive layer	0.03	Droughty	0.08
WhC:									
Whitsett----------	60	Not limited		Somewhat limited		Somewhat limited		Somewhat limited	
				Too clayey	0.28	Too clayey	0.28	Droughty	0.18
WPD:									
Whitsett----------	60	Not limited		Somewhat limited		Somewhat limited		Somewhat limited	
				Too clayey	0.28	Too clayey	0.28	Droughty	0.18
Picosa------------	30	Not limited		Very limited		Very limited		Somewhat limited	
				Restrictive layer	1.00	Restrictive layer	1.00	Droughty	0.92
ZaB:									
Zavala, frequently flooded----------	60	Not limited		Very limited		Very limited		Somewhat limited	
				Flooding	1.00	Flooding	1.00	Droughty	0.08
Zavala, occasionally flooded----------	20	Not limited		Not limited		Not limited		Somewhat limited	
								Droughty	0.08
ZvC:									
Zavco-------------	90	Not limited		Not limited		Not limited		Not limited	

Table 9.--Rangeland Dozing and Grubbing, Prescribed Burning, and Mechanical Seeding

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Rangeland Dozing and Grubbing		Rangeland Prescribed Burning		Rangeland Planting by Mechanical Seeding	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AgB:							
Aguilares	80	Not limited		Somewhat limited		Very limited	
				Droughty	0.44	Excess salt	1.00
				K factor	0.20	Droughty	0.44
AlB:							
Alet, occasionally flooded	55	Not limited		Somewhat limited		Somewhat limited	
				Droughty	0.07	Droughty	0.07
Alet, frequently flooded	20	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Droughty	0.07	Flooding	1.00
						Droughty	0.07
AnC:							
Annarose	75	Not limited		Somewhat limited		Somewhat limited	
				Droughty	0.08	Droughty	0.08
				K factor	0.11		
ANS:							
Area not surveyed	100	Not Rated		Not Rated		Not Rated	
BeC:							
Benavides	90	Not limited		Somewhat limited		Somewhat limited	
				Droughty	0.25	Droughty	0.25
				K factor	0.04		
BkB:							
Bookout	85	Very limited		Somewhat limited		Not limited	
		Too clayey	1.00	K factor	0.20		
BnB:							
Brennan	70	Not limited		Somewhat limited		Somewhat limited	
				Droughty	0.25	Droughty	0.25
				K factor	0.11		
BrB:							
Brundage	80	Not limited		Somewhat limited		Very limited	
				Droughty	0.34	Excess salt	1.00
				K factor	0.36	Droughty	0.34
BsB:							
Brystal	80	Not limited		Somewhat limited		Somewhat limited	
				Droughty	0.25	Droughty	0.25
				K factor	0.20		
BuA:							
Buchel, occasionally flooded	85	Very limited		Somewhat limited		Somewhat limited	
		Too clayey	1.00	K factor	0.20	Too clayey	0.50

Table 9.--Rangeland Dozing and Grubbing, Prescribed Burning, and Mechanical Seeding--Continued

Map symbol and soil name	Pct. of map unit	Rangeland Dozing and Grubbing		Rangeland Prescribed Burning		Rangeland Planting by Mechanical Seeding	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
BzA:							
Buchel, frequently flooded	95	Very limited		Somewhat limited		Very limited	
		Too clayey	1.00	K factor	0.20	Flooding	1.00
		Flooding	1.00			Too clayey	0.50
CaB:							
Caid	80	Not limited		Somewhat limited		Somewhat limited	
				Droughty	0.08	Droughty	0.08
				K factor	0.04		
CbB:							
Campbellton	70	Not limited		Somewhat limited		Somewhat limited	
				K factor	0.20	Excess salt	0.50
CcB:							
Catarina	90	Very limited		Somewhat limited		Very limited	
		Too clayey	1.00	Droughty	0.96	Excess salt	1.00
				K factor	0.20	Droughty	0.96
						Too clayey	0.50
ChB:							
Chacon	80	Not limited		Somewhat limited		Somewhat limited	
				K factor	0.20	Excess salt	0.22
CkB:							
Choke	70	Very limited		Somewhat limited		Not limited	
		Too clayey	1.00	K factor	0.20		
ClA:							
Cochina, occasionally flooded	90	Very limited		Somewhat limited		Somewhat limited	
		Too clayey	1.00	Droughty	0.76	Excess salt	0.94
				K factor	0.20	Droughty	0.76
						Too clayey	0.50
CmA:							
Cochina, frequently flooded	90	Very limited		Somewhat limited		Very limited	
		Too clayey	1.00	Droughty	0.76	Flooding	1.00
		Flooding	1.00	K factor	0.20	Excess salt	0.94
						Droughty	0.76
						Too clayey	0.50
CnB:							
Colmena	82	Not limited		Somewhat limited		Somewhat limited	
				Droughty	0.08	Droughty	0.08
CoB:							
Conquista	95	Very limited		Somewhat limited		Somewhat limited	
		Too clayey	1.00	K factor	0.20	Too clayey	0.50

Table 9.--Rangeland Dozing and Grubbing, Prescribed Burning, and Mechanical Seeding--Continued

Map symbol and soil name	Pct. of map unit	Rangeland Dozing and Grubbing		Rangeland Prescribed Burning		Rangeland Planting by Mechanical Seeding	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CpC:							
Copita	80	Not limited		Somewhat limited		Somewhat limited	
				Droughty	0.25	Droughty	0.25
				K factor	0.01	Restrictive layer	0.04
CtA:							
Coquat, frequently flooded	85	Very limited		Somewhat limited		Very limited	
		Too clayey	1.00	Droughty	0.16	Flooding	1.00
		Flooding	1.00	K factor	0.20	Droughty	0.16
						Too clayey	0.50
CuB:							
Cotulla	70	Very limited		Somewhat limited		Very limited	
		Too clayey	1.00	Droughty	0.40	Excess salt	1.00
				K factor	0.20	Droughty	0.40
CVB:							
Cotulla	70	Very limited		Somewhat limited		Very limited	
		Too clayey	1.00	Droughty	0.40	Excess salt	1.00
				K factor	0.20	Droughty	0.40
Maverick	20	Very limited		Somewhat limited		Very limited	
		Too clayey	1.00	K factor	0.20	Excess salt	1.00
						Too clayey	0.50
CyB:							
Coy	90	Very limited		Somewhat limited		Not limited	
		Too clayey	1.00	K factor	0.20		
CZB:							
Czar	60	Not limited		Somewhat limited		Not limited	
				K factor	0.20		
Clareville, rarely flooded	30	Not limited		Somewhat limited		Not limited	
				K factor	0.20		
DAM:							
Dams	100	Not Rated		Not Rated		Not Rated	
DsB:							
Dosrios	80	Very limited		Somewhat limited		Somewhat limited	
		Too clayey	1.00	K factor	0.11	Too clayey	0.50
						Excess salt	0.06
EsB:							
Eloso	70	Very limited		Somewhat limited		Somewhat limited	
		Too clayey	1.00	K factor	0.11	Restrictive layer	0.01
						Too clayey	0.50
EvC:							
Esseville	75	Very limited		Somewhat limited		Somewhat limited	
		Too clayey	1.00	K factor	0.20	Excess salt	0.08
						Restrictive layer	0.06
						Too clayey	0.50

Table 9.--Rangeland Dozing and Grubbing, Prescribed Burning, and Mechanical Seeding--Continued

Map symbol and soil name	Pct. of map unit	Rangeland Dozing and Grubbing		Rangeland Prescribed Burning		Rangeland Planting by Mechanical Seeding	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
FaC:							
Fashing--------------	90	Very limited		Somewhat limited		Very limited	
		Too clayey	1.00	Droughty	0.08	Excess salt	1.00
		Restrictive layer	0.05	K factor	0.20	Restrictive layer	0.84
						Droughty	0.08
						Too clayey	0.50
FoB:							
Floresville, eroded-	75	Not limited		Somewhat limited		Somewhat limited	
				Droughty	0.25	Droughty	0.25
				K factor	0.11		
HnC:							
Hindes---------------	85	Very limited		Somewhat limited		Very limited	
		Too clayey	1.00	Droughty	0.98	Too gravelly	1.00
						Droughty	0.98
HoB:							
Houla----------------	66	Not limited		Somewhat limited		Not limited	
				K factor	0.11		
ImB:							
Imogene, occasionally flooded------------	80	Not limited		Somewhat limited		Very limited	
				K factor	0.36	Excess salt	1.00
LaB:							
Laparita, rarely flooded------------	70	Very limited		Somewhat limited		Somewhat limited	
		Too clayey	1.00	K factor	0.20	Excess salt	0.24
LeB:							
Lasalle--------------	80	Very limited		Somewhat limited		Very limited	
		Too clayey	1.00	Droughty	0.18	Excess salt	1.00
				K factor	0.20	Droughty	0.18
						Too clayey	0.50
LnB:							
Leoncita------------	85	Not limited		Somewhat limited		Somewhat limited	
				Droughty	0.25	Droughty	0.25
				K factor	0.04		
LoC:							
Lomart--------------	80	Not limited		Somewhat limited		Somewhat limited	
				K factor	0.11	Restrictive layer	0.56
MaD:							
Mata----------------	91	Not limited		Somewhat limited		Somewhat limited	
				Droughty	0.92	Droughty	0.92
				K factor	0.20	Excess salt	0.22
McC:							
Maverick------------	80	Very limited		Somewhat limited		Very limited	
		Too clayey	1.00	K factor	0.20	Excess salt	1.00
						Too clayey	0.50

Table 9.--Rangeland Dozing and Grubbing, Prescribed Burning, and Mechanical Seeding--Continued

Map symbol and soil name	Pct. of map unit	Rangeland Dozing and Grubbing		Rangeland Prescribed Burning		Rangeland Planting by Mechanical Seeding	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
MgD:							
Mirasol	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Restrictive layer	0.26	Droughty	0.92	Droughty	0.92
						Restrictive layer	0.91
						Too gravelly	0.74
MoC:							
Moglia	80	Not limited		Somewhat limited		Somewhat limited	
				Droughty	0.08	Excess salt	0.78
				K factor	0.20	Droughty	0.08
MtB:							
Montell	80	Very limited		Somewhat limited		Somewhat limited	
		Too clayey	1.00	K factor	0.20	Excess salt	0.22
						Too clayey	0.50
MwA:							
Monwebb, occasionally flooded	80	Very limited		Somewhat limited		Somewhat limited	
		Too clayey	1.00	K factor	0.20	Too clayey	0.50
OmD:							
Olmedo	90	Very limited		Very limited		Very limited	
		Large stones	1.00	Droughty	1.00	Droughty	1.00
		Restrictive layer	0.05	Large stones	1.00	Restrictive layer	0.84
						Too gravelly	0.54
PIT:							
Pits	100	Not limited		Very limited		Not Rated	
				Droughty	1.00		
PkC:							
Pavelek, severely eroded	70	Very limited		Somewhat limited		Not limited	
		Too clayey	1.00	K factor	0.36		
PrC:							
Pernitas	90	Not limited		Somewhat limited		Somewhat limited	
				Droughty	0.08	Droughty	0.08
				K factor	0.11		
PtC:							
Pernitas	85	Not limited		Somewhat limited		Somewhat limited	
				Droughty	0.08	Droughty	0.08
				K factor	0.20		
RNB:							
Rhymes	60	Very limited		Very limited		Very limited	
		Wind erosion	1.00	Wind erosion	1.00	Droughty	1.00
				Droughty	1.00	Sandy surface	0.50
Nusil	30	Very limited		Very limited		Very limited	
		Wind erosion	1.00	Wind erosion	1.00	Droughty	1.00
				Droughty	1.00	Sandy surface	0.50

Table 9.--Rangeland Dozing and Grubbing, Prescribed Burning, and Mechanical Seeding--Continued

Map symbol and soil name	Pct. of map unit	Rangeland Dozing and Grubbing		Rangeland Prescribed Burning		Rangeland Planting by Mechanical Seeding	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
RoB:							
Rosenbrock	70	Very limited		Somewhat limited		Somewhat limited	
		Too clayey	1.00	K factor	0.04	Too clayey	0.50
SaB:							
Salco	85	Not limited		Somewhat limited		Not limited	
				K factor	0.04		
ScD:							
Sancajo	80	Very limited		Very limited		Very limited	
		Large stones	1.00	Droughty	1.00	Droughty	1.00
				Large stones	1.00	Too gravelly	0.54
SrC:							
Sarnosa	80	Not limited		Somewhat limited		Somewhat limited	
				Droughty	0.25	Droughty	0.25
				K factor	0.04		
StB:							
Sinton, frequently flooded	75	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	K factor	0.11	Flooding	1.00
TaB:							
Tela, occasionally flooded	70	Not limited		Somewhat limited		Somewhat limited	
				Droughty	0.25	Droughty	0.25
				K factor	0.11		
Tela, frequently flooded	20	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Droughty	0.25	Flooding	1.00
				K factor	0.11	Droughty	0.25
ToB:							
Tordia	90	Very limited		Somewhat limited		Somewhat limited	
		Too clayey	1.00	K factor	0.20	Too clayey	0.50
VeC:							
Verick	80	Very limited		Somewhat limited		Very limited	
		Restrictive layer	1.00	Droughty	0.08	Restrictive layer	1.00
				K factor	0.04	Droughty	0.08
VrC:							
Viboras	90	Very limited		Somewhat limited		Very limited	
		Too clayey	1.00	Droughty	0.76	Excess salt	1.00
				K factor	0.20	Droughty	0.76
						Restrictive layer	0.30
						Too clayey	0.50
W:							
Water	100	Not Rated		Not Rated		Not Rated	
WbB:							
Webb	85	Not limited		Somewhat limited		Not limited	
				K factor	0.36		

Table 9.--Rangeland Dozing and Grubbing, Prescribed Burning, and Mechanical Seeding--Continued

Map symbol and soil name	Pct. of map unit	Rangeland Dozing and Grubbing		Rangeland Prescribed Burning		Rangeland Planting by Mechanical Seeding	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
WeB: Weesatche	85	Not limited		Somewhat limited Droughty K factor	 0.25 0.20	Somewhat limited Droughty	 0.25
WeC: Weesatche	86	Not limited		Somewhat limited Droughty K factor	 0.25 0.20	Somewhat limited Droughty	 0.25
WgC: Weigang	87	Somewhat limited Restrictive layer	 0.03	Somewhat limited Droughty K factor	 0.08 0.04	Somewhat limited Restrictive layer Droughty	 0.83 0.08
WhC: Whitsett	60	Not limited		Somewhat limited Droughty K factor	 0.18 0.20	Somewhat limited Droughty Restrictive layer	 0.18 0.14
WPD: Whitsett	60	Not limited		Somewhat limited Droughty K factor	 0.18 0.20	Somewhat limited Droughty Restrictive layer	 0.18 0.14
Picosa	30	Very limited Restrictive layer	 1.00	Somewhat limited Droughty	 0.92	Very limited Restrictive layer Droughty	 1.00 0.92
ZaB: Zavala, frequently flooded	60	Very limited Flooding	 1.00	Somewhat limited Droughty K factor	 0.08 0.11	Very limited Flooding Droughty	 1.00 0.08
Zavala, occasionally flooded	20	Not limited		Somewhat limited Droughty K factor	 0.08 0.11	Somewhat limited Droughty	 0.08
ZvC: Zavco	90	Not limited		Somewhat limited K factor	 0.01	Not limited	

Table 10.--Ranch Access Roads

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Ranch Access Roads	
		Rating class and limiting features	Value
AgB:			
Aguilares	80	Not limited	
AlB:			
Alet, occasionally flooded	55	Not limited	
Alet, frequently flooded	20	Very limited	
		Flooding	1.00
AnC:			
Annarose	75	Not limited	
ANS:			
Area not surveyed	100	Not rated	
BeC:			
Benavides	90	Not limited	
BkB:			
Bookout	85	Not limited	
BnB:			
Brennan	70	Not limited	
BrB:			
Brundage	80	Not limited	
BsB:			
Brystal	80	Not limited	
BuA:			
Buchel, occasionally flooded	85	Somewhat limited	
		Too clayey	0.25
BzA:			
Buchel, frequently flooded	95	Very limited	
		Flooding	1.00
		Too clayey	0.25
CaB:			
Caid	80	Not limited	

Table 10.--Ranch Access Roads--Continued

Map symbol and soil name	Pct. of map unit	Ranch Access Roads	
		Rating class and limiting features	Value
CbB:			
Campbellton	70	Not limited	
CcB:			
Catarina	90	Somewhat limited	
		Too clayey	0.25
ChB:			
Chacon	80	Not limited	
CkB:			
Choke	70	Not limited	
ClA:			
Cochina, occasionally flooded	90	Somewhat limited	
		Too clayey	0.25
CmA:			
Cochina, frequently flooded	90	Very limited	
		Flooding	1.00
		Too clayey	0.25
CnB:			
Colmena	82	Not limited	
CoB:			
Conquista	95	Somewhat limited	
		Too clayey	0.25
CpC:			
Copita	80	Not limited	
CtA:			
Coquat, frequently flooded	85	Very limited	
		Flooding	1.00
		Too clayey	0.25
CuB:			
Cotulla	70	Not limited	
CVB:			
Cotulla	70	Not limited	
Maverick	20	Somewhat limited	
		Too clayey	0.25
CyB:			
Coy	90	Not limited	

Table 10.--Ranch Access Roads--Continued

Map symbol and soil name	Pct. of map unit	Ranch Access Roads	
		Rating class and limiting features	Value
CZB:			
Czar	60	Not limited	
Clareville, rarely flooded	30	Not limited	
DAM:			
Dams	100	Not rated	
DsB:			
Dosrios	80	Somewhat limited	
		Too clayey	0.25
EsB:			
Eloso	70	Somewhat limited	
		Too clayey	0.25
EvC:			
Esseville	75	Somewhat limited	
		Too clayey	0.25
FaC:			
Fashing	90	Somewhat limited	
		Too clayey	0.25
FoB:			
Floresville, eroded	75	Not limited	
HnC:			
Hindes	85	Somewhat limited	
		Too gravelly	0.55
HoB:			
Houla	66	Not limited	
ImB:			
Imogene, occasionally flooded	80	Not limited	
LaB:			
Laparita, rarely flooded	70	Not limited	
LeB:			
Lasalle	80	Somewhat limited	
		Too clayey	0.25
LnB:			
Leoncita	85	Not limited	
LoC:			
Lomart	80	Somewhat limited	
		Dusty	0.50

Table 10.--Ranch Access Roads--Continued

Map symbol and soil name	Pct. of map unit	Ranch Access Roads	
		Rating class and limiting features	Value
MaD:			
Mata	91	Not limited	
McC:			
Maverick	80	Somewhat limited	
		Too clayey	0.25
MgD:			
Mirasol	85	Not limited	
MoC:			
Moglia	80	Not limited	
MtB:			
Montell	80	Somewhat limited	
		Too clayey	0.25
MwA:			
Monwebb, occasionally flooded	80	Somewhat limited	
		Too clayey	0.25
OmD:			
Olmedo	90	Very limited	
		Large stones	1.00
PIT:			
Pits	100	Not rated	
PkC:			
Pavelek, severely eroded	70	Very limited	
		Depth to permafrost	1.00
PrC:			
Pernitas	90	Not limited	
PtC:			
Pernitas	85	Not limited	
RNB:			
Rhymes	60	Somewhat limited	
		Sandy surface	0.50
Nusil	30	Somewhat limited	
		Sandy surface	0.50
RoB:			
Rosenbrock	70	Somewhat limited	
		Too clayey	0.25
SaB:			
Salco	85	Not limited	

Table 10.--Ranch Access Roads--Continued

Map symbol and soil name	Pct. of map unit	Ranch Access Roads	
		Rating class and limiting features	Value
ScD:			
Sancajo	80	Very limited	
		Large stones	1.00
SrC:			
Sarnosa	80	Not limited	
StB:			
Sinton, frequently flooded	75	Very limited	
		Flooding	1.00
TaB:			
Tela, occasionally flooded	70	Not limited	
Tela, frequently flooded	20	Very limited	
		Flooding	1.00
ToB:			
Tordia	90	Somewhat limited	
		Too clayey	0.25
VeC:			
Verick	80	Not limited	
VrC:			
Viboras	90	Somewhat limited	
		Too clayey	0.25
W:			
Water	100	Not rated	
WbB:			
Webb	85	Somewhat limited	
		Dusty	0.50
WeB:			
Weesatche	85	Not limited	
WeC:			
Weesatche	86	Not limited	
WgC:			
Weigang	87	Not limited	
WhC:			
Whitsett	60	Not limited	
WPD:			
Whitsett	60	Not limited	
Picosa	30	Not limited	

Table 10.--Ranch Access Roads--Continued

Map symbol and soil name	Pct. of map unit	Ranch Access Roads	
		Rating class and limiting features	Value
ZaB:			
Zavala, frequently flooded	60	Very limited	
		Flooding	1.00
Zavala, occasionally flooded	20	Not limited	
ZvC:			
Zavco	90	Not limited	

Table 11.--Plastic Water Pipelines, and Fencing Posts

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Shallow Excavations for Plastic Water Pipelines		Fencing, Post Depth Less Than 24 inches		Fencing, Post Depth Less Than 36 inches	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AgB:							
Aguilares	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.68	Too clayey	0.68	Too clayey	0.68
		High shrink-swell	0.39	High shrink-swell	0.48	High shrink-swell	0.52
		Unstable excavation walls	0.10	Excess salt	0.50	Excess salt	0.50
AlB:							
Alet, occasionally flooded	55	Very limited		Very limited		Very Limited	
		Very frequent flooding	1.00	Very frequent flooding	1.00	Very frequent flooding	1.00
		Too clayey	0.74	Too clayey	0.74	Too clayey	0.74
		Unstable excavation walls	0.10				
Alet, frequently flooded	20	Very limited		Very limited		Very Limited	
		Very frequent flooding	1.00	Very frequent flooding	1.00	Very frequent flooding	1.00
		Too clayey	0.74	Too clayey	0.74	Too clayey	0.74
		Unstable excavation walls	0.10				
AnC:							
Annarose	75	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.48	Too clayey	0.48	Too clayey	0.48
		Unstable excavation walls	0.50	High shrink-swell	0.01	High shrink-swell	0.01
ANS:							
Area not surveyed	100	Not rated		Not rated		Not rated	
BeC:							
Benavides	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.32	Too clayey	0.32	Too clayey	0.92
		High shrink-swell	0.02	High shrink-swell	0.02	High shrink-swell	0.02
		Unstable excavation walls	0.10				
BkB:							
Bookout	85	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		High shrink-swell	0.39	High shrink-swell	0.59	High shrink-swell	0.60
		Unstable excavation walls	0.10				
BnB:							
Brennan	70	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.74	Too clayey	0.74	Too clayey	0.74
		Unstable excavation walls	0.10				

Table 11.--Plastic Water Pipelines, and Fencing Posts--Continued

Map symbol and soil name	Pct. of map unit	Shallow Excavations for Plastic Water Pipelines		Fencing, Post Depth Less Than 24 inches		Fencing, Post Depth Less Than 36 inches	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
BrB:							
Brundage	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.86	Too clayey	0.86	Too clayey	0.86
		High shrink-swell	0.39	High shrink-swell	0.43	High shrink-swell	0.49
		Unstable excavation walls	0.10	Excess salt	0.50	Excess salt	0.50
BsB:							
Brystal	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.68	Too clayey	0.68	Too clayey	0.68
		Unstable excavation walls	0.10				
BuA:							
Buchel, occasionally flooded	85	Very limited		Very limited		Very Limited	
		Very frequent flooding	1.00	Too clayey	1.00	Too clayey	1.00
		Too clayey	1.00	Very frequent flooding	1.00	Very frequent flooding	1.00
		Unstable excavation walls	1.00	High shrink-swell	1.00	High shrink-swell	1.00
		High shrink-swell	0.50				
BzA:							
Buchel, frequently flooded	95	Very limited		Very limited		Very Limited	
		Very frequent flooding	1.00	Too clayey	1.00	Too clayey	1.00
		Too clayey	1.00	Very frequent flooding	1.00	Very frequent flooding	1.00
		Unstable excavation walls	1.00	High shrink-swell	1.00	High shrink-swell	1.00
		High shrink-swell	0.50				
CaB:							
Caid	80	Somewhat limited		Somewhat limited		Very Limited	
		Too clayey	0.95	Too clayey	0.95	Too clayey	1.00
		High shrink-swell	0.39	High shrink-swell	0.31	High shrink-swell	0.38
		Unstable excavation walls	0.10				
CbB:							
Campbellton	70	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Unstable excavation walls	0.50	High shrink-swell	0.59	High shrink-swell	0.60
		High shrink-swell	0.27			Excess salt	0.50
CcB:							
Catarina	90	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Unstable excavation walls	1.00	High shrink-swell	1.00	High shrink-swell	1.00
		High shrink-swell	0.50	Excess salt	0.50	Excess salt	0.50

Table 11.--Plastic Water Pipelines, and Fencing Posts--Continued

Map symbol and soil name	Pct. of map unit	Shallow Excavations for Plastic Water Pipelines		Fencing, Post Depth Less Than 24 inches		Fencing, Post Depth Less Than 36 inches	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
ChB:							
Chacon	80	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		High shrink-swell	0.50	High shrink-swell	1.00	High shrink-swell	1.00
		Unstable excavation walls	0.10				
CkB:							
Choke	70	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		High shrink-swell	0.30	High shrink-swell	0.73	High shrink-swell	0.72
		Unstable excavation walls	0.10				
ClA:							
Cochina, occasionally flooded	90	Very limited		Very limited		Very Limited	
		Very frequent flooding	1.00	Too clayey	1.00	Too clayey	1.00
		Too clayey	1.00	Very frequent flooding	1.00	Very frequent flooding	1.00
		Unstable excavation walls	1.00	High shrink-swell	1.00	High shrink-swell	1.00
		High shrink-swell	0.50			Excess salt	0.50
CmA:							
Cochina, frequently flooded	90	Very limited		Very limited		Very Limited	
		Very frequent flooding	1.00	Too clayey	1.00	Too clayey	1.00
		Too clayey	1.00	Very frequent flooding	1.00	Very frequent flooding	1.00
		Unstable excavation walls	1.00	High shrink-swell	1.00	High shrink-swell	1.00
		High shrink-swell	0.50			Excess salt	0.50
CnB:							
Colmena	82	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.74	Too clayey	0.74	Too clayey	0.80
		High shrink-swell	0.39	High shrink-swell	0.33	High shrink-swell	0.40
		Unstable excavation walls	0.10				
CoB:							
Conquista	95	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		High shrink-swell	0.50	High shrink-swell	1.00	High shrink-swell	1.00
		Unstable excavation walls	0.10				
CpC:							
Copita	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.54	Too clayey	0.54	Too clayey	0.54
		Unstable excavation walls	0.50				

Table 11.--Plastic Water Pipelines, and Fencing Posts--Continued

Map symbol and soil name	Pct. of map unit	Shallow Excavations for Plastic Water Pipelines		Fencing, Post Depth Less Than 24 inches		Fencing, Post Depth Less Than 36 inches	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CtA:							
Coquat, frequently flooded	85	Very limited		Very limited		Very Limited	
		Very frequent flooding	1.00	Too clayey	1.00	Too clayey	1.00
		Too clayey	1.00	Very frequent flooding	1.00	Very frequent flooding	1.00
		Unstable excavation walls	1.00	High shrink-swell	1.00	High shrink-swell	1.00
		High shrink-swell	0.50				
CuB:							
Cotulla	70	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Unstable excavation walls	1.00	High shrink-swell	1.00	High shrink-swell	1.00
		High shrink-swell	0.50	Excess salt	0.50	Excess salt	0.50
CVB:							
Cotulla	70	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Unstable excavation walls	1.00	High shrink-swell	1.00	High shrink-swell	1.00
		High shrink-swell	0.50	Excess salt	0.50	Excess salt	0.50
Maverick	20	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		High shrink-swell	0.09	High shrink-swell	1.00	High shrink-swell	0.97
		Unstable excavation walls	0.10	Excess salt	0.50	Excess salt	0.50
CyB:							
Coy	90	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		High shrink-swell	0.50	High shrink-swell	1.00	High shrink-swell	1.00
		Unstable excavation walls	0.10				
CZB:							
Czar	60	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.95	Too clayey	0.95	Too clayey	0.95
		High shrink-swell	0.49	High shrink-swell	0.81	High shrink-swell	0.84
		Occasional flooding	0.20	Occasional flooding	0.20	Occasional flooding	0.20
		Unstable excavation walls	0.10				
Clareville, rarely flooded	30	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		High shrink-swell	0.50	High shrink-swell	0.98	High shrink-swell	1.00
		Occasional flooding	0.20	Occasional flooding	0.20	Occasional flooding	0.20
		Unstable excavation walls	0.10				

Table 11.--Plastic Water Pipelines, and Fencing Posts--Continued

Map symbol and soil name	Pct. of map unit	Shallow Excavations for Plastic Water Pipelines		Fencing, Post Depth Less Than 24 inches		Fencing, Post Depth Less Than 36 inches	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
DAM:							
Dams	100	Not rated		Not rated		Not rated	
DsB:							
Dosrios	80	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Unstable excavation walls	1.00	High shrink-swell	1.00	High shrink-swell	1.00
		High shrink-swell	0.50				
EsB:							
Eloso	70	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Unstable excavation walls	0.50	High shrink-swell	1.00	High shrink-swell	0.96
		High shrink-swell	0.07				
EvC:							
Esseville	75	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Unstable excavation walls	1.00	High shrink-swell	1.00	High shrink-swell	1.00
		High shrink-swell	0.43			Excess salt	0.50
FaC:							
Fashing	90	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		High shrink-swell	0.50	Excess salt	0.50	Depth to densic bedrock	0.79
		Depth to densic bedrock	0.32	Depth to densic bedrock	0.32	Excess salt	0.50
		Unstable excavation walls	0.10	High shrink-swell	0.03		
FoB:							
Floresville, eroded	75	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		High shrink-swell	0.39	High shrink-swell	0.28	High shrink-swell	0.36
		Unstable excavation walls	0.10				
HnC:							
Hindes	85	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Unstable excavation walls	1.00	Too gravelly	1.00	Too gravelly	1.00
				Too acid	0.02	Too acid	0.02
HoB:							
Houla	66	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.96	Too clayey	0.96	Too clayey	0.96
		High shrink-swell	0.26	High shrink-swell	0.59	High shrink-swell	0.60
		Unstable excavation walls	0.10				

Table 11.--Plastic Water Pipelines, and Fencing Posts--Continued

Map symbol and soil name	Pct. of map unit	Shallow Excavations for Plastic Water Pipelines		Fencing, Post Depth Less Than 24 inches		Fencing, Post Depth Less Than 36 inches	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
ImB:							
Imogene, occasionally flooded	80	Very limited		Very limited		Very Limited	
		Very frequent flooding	1.00	Very frequent flooding	1.00	Very frequent flooding	1.00
		Too clayey	0.80	Too clayey	0.80	Too clayey	0.80
		High shrink-swell	0.39	High shrink-swell	0.47	High shrink-swell	0.52
		Unstable excavation walls	0.10				
LaB:							
Laparita, rarely flooded	70	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		High shrink-swell	0.50	High shrink-swell	1.00	High shrink-swell	1.00
		Occasional flooding	0.20	Occasional flooding	0.20	Excess salt	0.50
		Unstable excavation walls	0.10			Occasional flooding	0.20
LeB:							
Lasalle	80	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Unstable excavation walls	1.00	High shrink-swell	1.00	High shrink-swell	1.00
		High shrink-swell	0.50	Excess salt	0.50	Excess salt	0.50
LnB:							
Leoncita	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.80	Too clayey	0.80	Too clayey	0.80
		High shrink-swell	0.39	High shrink-swell	0.28	High shrink-swell	0.36
		Unstable excavation walls	0.10				
LoC:							
Lomart	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.16	Too clayey	0.16	Depth to paralithic bedrock	0.68
		Unstable excavation walls	0.50			Too clayey	0.16
MaD:							
Mata	91	Very limited		Somewhat limited		Somewhat limited	
		Unstable excavation walls	1.00	Too gravelly	0.97	Too gravelly	0.99
		Too clayey	0.92	Too clayey	0.92	Too clayey	0.92
		High shrink-swell	0.03	High shrink-swell	0.02	High shrink-swell	0.17
						Excess salt	0.50
McC:							
Maverick	80	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		High shrink-swell	0.09	High shrink-swell	1.00	High shrink-swell	0.97
		Unstable excavation walls	0.10	Excess salt	0.50	Excess salt	0.50

Table 11.--Plastic Water Pipelines, and Fencing Posts--Continued

Map symbol and soil name	Pct. of map unit	Shallow Excavations for Plastic Water Pipelines		Fencing, Post Depth Less Than 24 inches		Fencing, Post Depth Less Than 36 inches	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
MgD:							
Mirasol	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.26	Too gravelly	0.82	Too gravelly	0.82
		Unstable excavation walls	0.10	Too clayey	0.26	Too clayey	0.26
MoC:							
Moglia	80	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		High shrink-swell	0.21	High shrink-swell	0.59	High shrink-swell	0.60
		Unstable excavation walls	0.10				
MtB:							
Montell	80	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Unstable excavation walls	1.00	High shrink-swell	1.00	High shrink-swell	1.00
		High shrink-swell	0.50				
MwA:							
Monwebb, occasionally flooded	80	Very limited		Very limited		Very Limited	
		Very frequent flooding	1.00	Too clayey	1.00	Too clayey	1.00
		Too clayey	1.00	Very frequent flooding	1.00	Very frequent flooding	1.00
		Unstable excavation walls	1.00	High shrink-swell	1.00	High shrink-swell	1.00
		High shrink-swell	0.50				
OmD:							
Olmedo	90	Very limited		Very limited		Very Limited	
		Unstable excavation walls	1.00	Too gravelly	1.00	Too gravelly	1.00
		Too clayey	0.24	Too clayey	0.24	Too clayey	0.24
PIT:							
Pits	100	Not rated		Not rated		Not rated	
PkC:							
Pavelek, severely eroded	70	Very limited		Very limited		Very Limited	
		Depth to paralithic bedrock	1.00	Too clayey	1.00	Too clayey	1.00
		Too clayey	1.00	Depth to paralithic bedrock	1.00	Depth to paralithic bedrock	1.00
		High shrink-swell	0.50	Depth to permafrost	1.00	Depth to permafrost	1.00
		Unstable excavation walls	0.10	High shrink-swell	0.01		

Table 11.--Plastic Water Pipelines, and Fencing Posts--Continued

Map symbol and soil name	Pct. of map unit	Shallow Excavations for Plastic Water Pipelines		Fencing, Post Depth Less Than 24 inches		Fencing, Post Depth Less Than 36 inches	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
PrC:							
Pernitas	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.84	Too clayey	0.84	Too clayey	0.92
		High shrink-swell	0.39	High shrink-swell	0.38	High shrink-swell	0.44
		Unstable excavation walls	0.10				
PtC:							
Pernitas	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.98	Too clayey	0.98	Too clayey	0.98
		High shrink-swell	0.39	High shrink-swell	0.37	High shrink-swell	0.43
		Unstable excavation walls	0.10				
RNB:							
Rhymes	60	Very limited		Not limited		Not limited	
		Unstable excavation walls	1.00				
		High shrink-swell	0.15				
Nusil	30	Very limited		Somewhat limited		Somewhat limited	
		Unstable excavation walls	1.00	Too Sandy	0.50	Too clayey	0.77
		High shrink-swell	0.01	High shrink-swell	0.04	High shrink-swell	0.09
RoB:							
Rosenbrock	70	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Unstable excavation walls	1.00	High shrink-swell	1.00	High shrink-swell	1.00
		High shrink-swell	0.50				
SaB:							
Salco	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.92	Too clayey	0.92	Too clayey	0.92
		High shrink-swell	0.39	High shrink-swell	0.59	High shrink-swell	0.60
		Unstable excavation walls	0.10				
ScD:							
Sancajo	80	Very limited		Very limited		Very Limited	
		Large stones	1.00	Large stones	1.00	Large stones	1.00
		Too clayey	0.54	Too gravelly	0.97	Too gravelly	0.97
		Unstable excavation walls	0.50	Too clayey	0.54	Too clayey	0.54
		High shrink-swell	0.50				
SrC:							
Sarnosa	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.26	Too clayey	0.26	Too clayey	0.26
		Unstable excavation walls	0.10				

Table 11.--Plastic Water Pipelines, and Fencing Posts--Continued

Map symbol and soil name	Pct. of map unit	Shallow Excavations for Plastic Water Pipelines		Fencing, Post Depth Less Than 24 inches		Fencing, Post Depth Less Than 36 inches	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
StB:							
Sinton, frequently flooded	75	Very limited		Very limited		Very Limited	
		Very frequent flooding	1.00	Very frequent flooding	1.00	Very frequent flooding	1.00
		Too clayey	0.82	Too clayey	0.82	Too clayey	0.82
		Unstable excavation walls	0.10				
TaB:							
Tela, occasionally flooded	70	Very limited		Very limited		Very Limited	
		Very frequent flooding	1.00	Very frequent flooding	1.00	Very frequent flooding	1.00
		Too clayey	0.77	Too clayey	0.77	Too clayey	0.77
		Unstable excavation walls	0.10				
Tela, frequently flooded	20	Very limited		Very limited		Very Limited	
		Very frequent flooding	1.00	Very frequent flooding	1.00	Very frequent flooding	1.00
		Too clayey	0.77	Too clayey	0.77	Too clayey	0.77
		Unstable excavation walls	0.10				
ToB:							
Tordia	90	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Unstable excavation walls	1.00	High shrink-swell	1.00	High shrink-swell	1.00
		High shrink-swell	0.32				
VeC:							
Verick	80	Very limited		Very limited		Very Limited	
		Depth to paralithic bedrock	1.00	Depth to paralithic bedrock	1.00	Depth to paralithic bedrock	1.00
		Too clayey	0.54	Too clayey	0.54	Too clayey	0.54
		Unstable excavation walls	0.10				
VrC:							
Viboras	90	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Unstable excavation walls	0.10	High shrink-swell	0.96	High shrink-swell	0.65
				Excess salt	0.50	Excess salt	0.50
						Depth to densic bedrock	0.17
W:							
Water	100	Not rated		Not rated		Not rated	

Table 11.--Plastic Water Pipelines, and Fencing Posts--Continued

Map symbol and soil name	Pct. of map unit	Shallow Excavations for Plastic Water Pipelines		Fencing, Post Depth Less Than 24 inches		Fencing, Post Depth Less Than 36 inches	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
WbB:							
Webb	85	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		High shrink-swell	0.36	High shrink-swell	0.28	High shrink-swell	0.40
		Unstable excavation walls	0.10				
WeB:							
Weesatche	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.88	Too clayey	0.88	Too clayey	0.88
		High shrink-swell	0.39	High shrink-swell	0.29	High shrink-swell	0.37
		Unstable excavation walls	0.10				
WeC:							
Weesatche	86	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.88	Too clayey	0.88	Too clayey	0.88
		High shrink-swell	0.39	High shrink-swell	0.38	High shrink-swell	0.44
		Unstable excavation walls	0.10				
WgC:							
Weigang	87	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Depth to paralithic bedrock	0.76	Depth to paralithic bedrock	0.76	Depth to paralithic bedrock	0.96
		Unstable excavation walls	0.10				
WhC:							
Whitsett	60	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Unstable excavation walls	0.50	High shrink-swell	0.17	High shrink-swell	0.05
						Depth to paralithic bedrock	0.08
WPD:							
Whitsett	60	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Unstable excavation walls	0.50	High shrink-swell	0.17	High shrink-swell	0.05
						Depth to paralithic bedrock	0.08
Picosa	30	Very limited		Very limited		Very Limited	
		Depth to paralithic bedrock	1.00	Depth to paralithic bedrock	1.00	Depth to paralithic bedrock	1.00
		Too clayey	0.74	Too clayey	0.74	Too clayey	0.74
		Unstable excavation walls	0.10				

Table 11.--Plastic Water Pipelines, and Fencing Posts--Continued

Map symbol and soil name	Pct. of map unit	Shallow Excavations for Plastic Water Pipelines		Fencing, Post Depth Less Than 24 inches		Fencing, Post Depth Less Than 36 inches	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
ZaB:							
Zavala, frequently flooded	60	Very limited		Very limited		Very Limited	
		Very frequent flooding	1.00	Very frequent flooding	1.00	Very frequent flooding	1.00
		Too clayey	0.01	Too clayey	0.01	Too clayey	0.01
		Unstable excavation walls	0.10				
Zavala, occasionally flooded	20	Very limited		Very limited		Very Limited	
		Very frequent flooding	1.00	Very frequent flooding	1.00	Very frequent flooding	1.00
		Too clayey	0.01	Too clayey	0.01	Too clayey	0.01
		Unstable excavation walls	0.10				
ZvC:							
Zavco	90	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		High shrink-swell	0.39	High shrink-swell	0.45	High shrink-swell	0.50
		Unstable excavation walls	0.10				

Table 12.--Grain and Seed Crops, Domestic Grasses and Legumes, and Irrigated Grain and Seed Crops for Food and Cover for Wildlife Habitat

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Grain and Seed Crops For Food and Cover		Domestic Grasses and Legumes for Food and Cover		Irrigated Grain and Seed Crops for Food and Cover	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AgB:							
Aguilares-----------	80	Very limited		Very limited		Very limited	
		HEL wind	1.00	Excess salt	1.00	HEL wind	1.00
		Droughty	1.00	Excess sodium	1.00	Droughty	1.00
		Excess salt	1.00	Too arid	0.50	Excess salt	1.00
		Excess Sodium	0.25			Excess Sodium	0.25
		Too arid	0.50				
AlB:							
Alet, occasionally flooded------------	55	Somewhat limited		Somewhat limited		Somewhat limited	
		Flooding	0.50	Flooding	0.50	Flooding	0.50
Alet, frequently flooded------------	20	Somewhat limited		Somewhat limited		Very limited	
		Flooding	0.50	Flooding	0.50	Flooding	1.00
AnC:							
Annarose------------	75	Very limited		Very limited		Very limited	
		Potentially or highly erodible	1.00	Potentially or highly erodible	1.00	Potentially or highly erodible	1.00
		HEL wind	1.00	Too arid	0.50	HEL wind	1.00
		Droughty	0.13			Droughty	0.13
		Too arid	0.50				
ANS:							
Area not surveyed---	100	Not rated		Not rated		Not rated	
BeC:							
Benavides-----------	90	Very limited		Very limited		Very limited	
		Potentially or highly erodible	1.00	Potentially or highly erodible	1.00	Potentially or highly erodible	1.00
		HEL wind	1.00	Too arid	0.50	HEL wind	1.00
		Droughty	0.27			Droughty	0.27
		Too arid	0.50				
BkB:							
Bookout-------------	85	Very limited		Somewhat limited		Very limited	
		HEL wind	1.00	Too clayey	0.70	HEL wind	1.00
		Too clayey	0.70	Too arid	0.50	Too clayey	0.70
		Too arid	0.50				
BnB:							
Brennan-------------	70	Very limited		Very limited		Very limited	
		Potentially or highly erodible	1.00	Potentially or highly erodible	1.00	Potentially or highly erodible	1.00
		HEL wind	1.00	Too arid	0.50	HEL wind	1.00
		Droughty	0.01			Droughty	0.01
		Too arid	0.50				

Table 12.--Grain and Seed Crops, Domestic Grasses and Legumes, and Irrigated Grain and Seed Crops for Food and Cover for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Grain and Seed Crops For Food and Cover		Domestic Grasses and Legumes for Food and Cover		Irrigated Grain and Seed Crops for Food and Cover	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
BrB:							
Brundage	80	Very limited		Very limited		Very limited	
		Percs slowly	1.00	Percs slowly	1.00	Percs slowly	1.00
		Excess salt	1.00	Excess salt	1.00	Excess salt	1.00
		Potentially or highly erodible	1.00	Potentially or highly erodible	1.00	Potentially or highly erodible	1.00
		HEL wind	1.00	Excess sodium	1.00	HEL wind	1.00
		Droughty	1.00	Droughty	0.01	Droughty	1.00
BsB:							
Brystal	80	Very limited		Somewhat limited		Very limited	
		HEL wind	1.00	Too arid	0.50	HEL wind	1.00
		Droughty	0.01			Droughty	0.01
		Too arid	0.50				
BuA:							
Buchel, occasionally flooded	85	Very limited		Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Flooding	0.50	Flooding	0.50	Flooding	0.50
		Percs slowly	0.50	Percs slowly	0.50	Percs slowly	0.50
BzA:							
Buchel, frequently flooded	95	Very limited		Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		HEL wind	1.00	Flooding	0.50	Flooding	1.00
		Flooding	0.50	Percs slowly	0.50	HEL wind	1.00
		Percs slowly	0.50			Percs slowly	0.50
CaB:							
Caid	80	Very limited		Very limited		Very limited	
		Potentially or highly erodible	1.00	Potentially or highly erodible	1.00	Potentially or highly erodible	1.00
		Droughty	0.20	Too arid	0.50	Droughty	0.20
		Too arid	0.50				
CbB:							
Campbellton	70	Very limited		Very limited		Very limited	
		Potentially or highly erodible	1.00	Excess sodium	1.00	Potentially or highly erodible	1.00
		Excess Sodium	1.00	Potentially or highly erodible	1.00	Excess Sodium	1.00
		Droughty	0.31	Excess salt	0.12	Droughty	0.31
		Excess salt	0.12	Too clayey	0.11	Excess salt	0.12
		Too clayey	0.11			Too clayey	0.11
CcB:							
Catarina	90	Very limited		Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Droughty	1.00	Excess sodium	1.00	Droughty	1.00
		HEL wind	1.00	Excess salt	1.00	HEL wind	1.00
		Excess salt	1.00	Droughty	0.54	Excess salt	1.00
		Excess Sodium	0.75	Percs slowly	0.50	Excess Sodium	0.75

Table 12.--Grain and Seed Crops, Domestic Grasses and Legumes, and Irrigated Grain and Seed Crops for Food and Cover for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Grain and Seed Crops For Food and Cover		Domestic Grasses and Legumes for Food and Cover		Irrigated Grain and Seed Crops for Food and Cover	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
ChB:							
Chacon	80	Very limited		Very limited		Very limited	
		Potentially or highly erodible	1.00	Potentially or highly erodible	1.00	Potentially or highly erodible	1.00
		HEL wind	1.00	Too arid	0.50	HEL wind	1.00
		Too arid	0.50	Percs slowly	0.50	Percs slowly	0.50
		Percs slowly	0.50	Too clayey	0.01	Too clayey	0.01
		Too clayey	0.01				
CkB:							
Choke	70	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.79	Too clayey	0.79	Too clayey	0.79
		Too arid	0.50	Too arid	0.50		
ClA:							
Cochina, occasionally flooded	90	Very limited		Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		HEL wind	1.00	Excess sodium	1.00	HEL wind	1.00
		Excess Sodium	0.99	Excess salt	0.88	Excess Sodium	0.99
		Droughty	0.92	Flooding	0.50	Droughty	0.92
		Excess salt	0.88	Percs slowly	0.50	Excess salt	0.88
CmA:							
Cochina, frequently flooded	90	Very limited		Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		HEL wind	1.00	Excess sodium	1.00	Flooding	1.00
		Excess Sodium	0.99	Excess salt	0.88	HEL wind	1.00
		Droughty	0.92	Flooding	0.50	Excess Sodium	0.99
		Excess salt	0.88	Percs slowly	0.50	Droughty	0.92
CnB:							
Colmena	82	Very limited		Not limited		Very limited	
		HEL wind	1.00			HEL wind	1.00
CoB:							
Conquista	95	Very limited		Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Percs slowly	1.00	Percs slowly	1.00	Percs slowly	1.00
		Potentially or highly erodible	1.00	Potentially or highly erodible	1.00	Potentially or highly erodible	1.00
		HEL wind	1.00			HEL wind	1.00
CpC:							
Copita	80	Very limited		Very limited		Very limited	
		Potentially or highly erodible	1.00	Potentially or highly erodible	1.00	Potentially or highly erodible	1.00
		HEL wind	1.00	Droughty	0.05	HEL wind	1.00
		Droughty	1.00	Too arid	0.50	Droughty	1.00
		Too arid	0.50	Bedrock	0.08	Bedrock	0.08
		Bedrock	0.08				

Table 12.--Grain and Seed Crops, Domestic Grasses and Legumes, and Irrigated Grain and Seed Crops for Food and Cover for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Grain and Seed Crops For Food and Cover		Domestic Grasses and Legumes for Food and Cover		Irrigated Grain and Seed Crops for Food and Cover	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CtA:							
Coquat, frequently flooded	85	Very limited		Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		HEL wind	1.00	Excess sodium	1.00	Flooding	1.00
		Droughty	0.99	Flooding	0.50	HEL wind	1.00
		Excess Sodium	0.17	Percs slowly	0.50	Droughty	0.99
		Flooding	0.50			Excess Sodium	0.17
CuB:							
Cotulla	70	Very limited		Very limited		Very limited	
		Potentially or highly erodible	1.00	Potentially or highly erodible	1.00	Potentially or highly erodible	1.00
		HEL wind	1.00	Excess salt	1.00	HEL wind	1.00
		Droughty	1.00	Excess sodium	1.00	Droughty	1.00
		Excess salt	1.00	Too clayey	0.99	Excess salt	1.00
		Excess Sodium	0.66	Droughty	0.02	Excess Sodium	0.66
CVB:							
Cotulla	70	Very limited		Very limited		Very limited	
		HEL wind	1.00	Excess salt	1.00	HEL wind	1.00
		Droughty	1.00	Excess sodium	1.00	Droughty	1.00
		Excess salt	1.00	Too clayey	0.99	Excess salt	1.00
		Excess Sodium	0.66	Droughty	0.02	Excess Sodium	0.66
		Too clayey	0.99	Percs slowly	0.50	Too clayey	0.99
Maverick	20	Very limited		Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		HEL wind	1.00	Excess sodium	1.00	HEL wind	1.00
		Excess salt	1.00	Excess salt	1.00	Excess salt	1.00
		Droughty	0.77	Too arid	0.50	Droughty	0.77
		Too arid	0.50	Percs slowly	0.50	Percs slowly	0.50
CyB:							
Coy	90	Very limited		Somewhat limited		Very limited	
		HEL wind	1.00	Too clayey	0.81	HEL wind	1.00
		Too clayey	0.81	Percs slowly	0.50	Too clayey	0.81
		Percs slowly	0.50			Percs slowly	0.50
CZB:							
Czar	60	Not limited		Not limited		Not limited	
Clareville, rarely flooded	30	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.19	Too clayey	0.19	Too clayey	0.19
DAM:							
Dams	100	Not rated		Not rated		Not rated	

Table 12.--Grain and Seed Crops, Domestic Grasses and Legumes, and Irrigated Grain and Seed Crops for Food and Cover for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Grain and Seed Crops For Food and Cover		Domestic Grasses and Legumes for Food and Cover		Irrigated Grain and Seed Crops for Food and Cover	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
DsB:							
Dosrios-------------	80	Very limited		Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Potentially or highly erodible	1.00	Excess sodium	1.00	Potentially or highly erodible	1.00
		HEL wind	1.00	Potentially or highly erodible	1.00	HEL wind	1.00
		Excess Sodium	0.03	Percs slowly	0.50	Excess Sodium	0.03
		Percs slowly	0.50			Percs slowly	0.50
EsB:							
Eloso---------------	70	Very limited		Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Percs slowly	0.50	Percs slowly	0.50	Percs slowly	0.50
		Bedrock	0.02	Bedrock	0.02	Bedrock	0.02
EvC:							
Esseville-----------	75	Very limited		Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Droughty	0.45	Excess sodium	0.08	Droughty	0.45
		Percs slowly	0.50	Percs slowly	0.50	Percs slowly	0.50
		Bedrock	0.14	Bedrock	0.14	Bedrock	0.14
FaC:							
Fashing-------------	90	Very limited		Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Bedrock	1.00	Bedrock	1.00	Bedrock	1.00
		Potentially or highly erodible	1.00	Excess sodium	1.00	Potentially or highly erodible	1.00
		HEL wind	1.00	Potentially or highly erodible	1.00	HEL wind	1.00
		Droughty	1.00	Excess salt	1.00	Droughty	1.00
FoB:							
Floresville, eroded-	75	Very limited		Very limited		Very limited	
		Potentially or highly erodible	1.00	Potentially or highly erodible	1.00	Potentially or highly erodible	1.00
		HEL wind	1.00	Percs slowly	0.33	HEL wind	1.00
		Percs slowly	0.33			Percs slowly	0.33
		Droughty	0.02			Droughty	0.02
HnC:							
Hindes--------------	85	Very limited		Very limited		Very limited	
		Droughty	1.00	Potentially or highly erodible	1.00	Droughty	1.00
		Potentially or highly erodible	1.00	Too gravelly, cobbly, or stony	1.00	Potentially or highly erodible	1.00
		Too gravelly, cobbly, or stony	1.00	Droughty	0.74	Too gravelly, cobbly, or stony	1.00
		Too arid	0.50	Too arid	0.50	Too clayey	0.11
		Too clayey	0.11	Too clayey	0.11		

Table 12.--Grain and Seed Crops, Domestic Grasses and Legumes, and Irrigated Grain and Seed Crops for Food and Cover for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Grain and Seed Crops For Food and Cover		Domestic Grasses and Legumes for Food and Cover		Irrigated Grain and Seed Crops for Food and Cover	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
HoB:							
Houla	66	Very limited		Somewhat limited		Very limited	
		HEL wind	1.00	Too arid	0.50	HEL wind	1.00
		Too arid	0.50	Too clayey	0.23	Too clayey	0.23
		Too clayey	0.23				
ImB:							
Imogene, occasionally flooded	80	Very limited		Very limited		Very limited	
		Potentially or highly erodible	1.00	Excess sodium	1.00	Potentially or highly erodible	1.00
		HEL wind	1.00	Potentially or highly erodible	1.00	HEL wind	1.00
		Excess salt	1.00	Excess salt	1.00	Excess salt	1.00
		Percs slowly	0.99	Percs slowly	0.99	Percs slowly	0.99
		Excess Sodium	0.97	Flooding	0.50	Excess Sodium	0.97
LaB:							
Laparita, rarely flooded	70	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.89	Excess sodium	0.03	Too clayey	0.89
		Percs slowly	0.50	Too clayey	0.89	Percs slowly	0.50
				Percs slowly	0.50		
LeB:							
Lasalle	80	Very limited		Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		HEL wind	1.00	Excess salt	1.00	HEL wind	1.00
		Droughty	1.00	Excess sodium	1.00	Droughty	1.00
		Excess salt	1.00	Droughty	0.18	Excess salt	1.00
		Excess Sodium	0.17	Percs slowly	0.50	Excess Sodium	0.17
LnB:							
Leoncita	85	Very limited		Very limited		Very limited	
		Potentially or highly erodible	1.00	Potentially or highly erodible	1.00	Potentially or highly erodible	1.00
		HEL wind	1.00	Too arid	0.50	HEL wind	1.00
		Droughty	0.03			Droughty	0.03
		Too arid	0.50				
LoC:							
Lomart	80	Very limited		Very limited		Very limited	
		Potentially or highly erodible	1.00	Potentially or highly erodible	1.00	Potentially or highly erodible	1.00
		HEL wind	1.00	Droughty	0.32	HEL wind	1.00
		Droughty	1.00	Bedrock	0.92	Droughty	1.00
		Bedrock	0.92	Too arid	0.50	Bedrock	0.92
		Too arid	0.50				

Table 12.--Grain and Seed Crops, Domestic Grasses and Legumes, and Irrigated Grain and Seed Crops for Food and Cover for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Grain and Seed Crops For Food and Cover		Domestic Grasses and Legumes for Food and Cover		Irrigated Grain and Seed Crops for Food and Cover	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
MaD: Mata	91	Very limited		Somewhat limited		Very limited	
		Droughty	1.00	Percs slowly	0.50	Droughty	1.00
		Percs slowly	0.50	Too gravelly, cobbly, or stony	0.16	Percs slowly	0.50
		Too gravelly, cobbly, or stony	0.16	Too arid	0.50	Too gravelly, cobbly, or stony	0.16
		Too arid	0.50	Too clayey	0.11	Too clayey	0.11
		Too clayey	0.11				
McC: Maverick	80	Very limited		Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Potentially or highly erodible	1.00	Excess sodium	1.00	Potentially or highly erodible	1.00
		HEL wind	1.00	Potentially or highly erodible	1.00	HEL wind	1.00
		Excess salt	1.00	Excess salt	1.00	Excess salt	1.00
		Droughty	0.77	Too arid	0.50	Droughty	0.77
MgD: Mirasol	85	Very limited		Very limited		Very limited	
		Droughty	1.00	Droughty	1.00	Droughty	1.00
		Cemented pan	1.00	Cemented pan	1.00	Cemented pan	1.00
		Potentially or highly erodible	1.00	Potentially or highly erodible	1.00	Potentially or highly erodible	1.00
		Too gravelly, cobbly, or stony	1.00	Too gravelly, cobbly, or stony	1.00	Too gravelly, cobbly, or stony	1.00
						Slope	0.12
MoC: Moglia	80	Very limited		Very limited		Very limited	
		Droughty	1.00	Excess sodium	1.00	Droughty	1.00
		Excess salt	0.50	Droughty	0.52	Excess salt	0.50
		Excess Sodium	0.34	Excess salt	0.50	Excess Sodium	0.34
		Too clayey	0.50	Too clayey	0.50	Too clayey	0.50
		Too arid	0.50	Too arid	0.50		
MtB: Montell	80	Very limited		Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		HEL wind	1.00	Excess sodium	1.00	HEL wind	1.00
		Excess Sodium	0.06	Percs slowly	0.50	Excess Sodium	0.06
		Percs slowly	0.50			Percs slowly	0.50
MwA: Monwebb, occasionally flooded	80	Very limited		Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		HEL wind	1.00	Flooding	0.50	HEL wind	1.00
		Flooding	0.50	Percs slowly	0.50	Flooding	0.50
		Percs slowly	0.50			Percs slowly	0.50

Table 12.--Grain and Seed Crops, Domestic Grasses and Legumes, and Irrigated Grain and Seed Crops for Food and Cover for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Grain and Seed Crops For Food and Cover		Domestic Grasses and Legumes for Food and Cover		Irrigated Grain and Seed Crops for Food and Cover	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
OmD:							
Olmedo	90	Very limited		Very limited		Very limited	
		Droughty	1.00	Droughty	1.00	Droughty	1.00
		Cemented pan	1.00	Cemented pan	1.00	Cemented pan	1.00
		Percs slowly	1.00	Percs slowly	1.00	Percs slowly	1.00
		Potentially or highly erodible	1.00	Potentially or highly erodible	1.00	Potentially or highly erodible	1.00
		Too gravelly, cobbly, or stony	1.00	Too gravelly, cobbly, or stony	1.00	Too gravelly, cobbly, or stony	1.00
PIT:							
Pits	100	Not rated		Not rated		Not rated	
PkC:							
Pavelek, severely eroded	70	Very limited		Very limited		Very limited	
		Droughty	1.00	Droughty	1.00	Droughty	1.00
		Bedrock	1.00	Bedrock	1.00	Bedrock	1.00
		Too clayey	0.95	Too clayey	0.95	Too clayey	0.95
		Percs slowly	0.17	Percs slowly	0.17	Percs slowly	0.17
PrC:							
Pernitas	90	Very limited		Very limited		Very limited	
		Potentially or highly erodible	1.00	Potentially or highly erodible	1.00	Potentially or highly erodible	1.00
		HEL wind	1.00			HEL wind	1.00
PtC:							
Pernitas	85	Not limited		Not limited		Not limited	
RNB:							
Rhymes	60	Very limited		Very limited		Very limited	
		Too sandy	1.00	Potentially or highly erodible	1.00	Potentially or highly erodible	1.00
		Potentially or highly erodible	1.00	Droughty	0.37	HEL wind	1.00
		HEL wind	1.00	Too sandy	0.50	Droughty	1.00
		Droughty	1.00			Too sandy	0.50
Nusil	30	Very limited		Very limited		Very limited	
		Too sandy	1.00	Potentially or highly erodible	1.00	Potentially or highly erodible	1.00
		Potentially or highly erodible	1.00	Droughty	0.18	HEL wind	1.00
		HEL wind	1.00	Too sandy	0.50	Droughty	1.00
		Droughty	1.00			Too sandy	0.50
RoB:							
Rosenbrock	70	Very limited		Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Percs slowly	0.50	Percs slowly	0.50	Percs slowly	0.50

Table 12.--Grain and Seed Crops, Domestic Grasses and Legumes, and Irrigated Grain and Seed Crops for Food and Cover for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Grain and Seed Crops For Food and Cover		Domestic Grasses and Legumes for Food and Cover		Irrigated Grain and Seed Crops for Food and Cover	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SaB:							
Salco	85	Very limited		Very limited		Very limited	
		Potentially or highly erodible	1.00	Potentially or highly erodible	1.00	Potentially or highly erodible	1.00
		Too arid	0.50	Too arid	0.50		
ScD:							
Sancajo	80	Very limited		Very limited		Very limited	
		Droughty	1.00	Droughty	1.00	Droughty	1.00
		Too gravelly, cobbly, or stony	1.00	Too gravelly, cobbly, or stony	1.00	Too gravelly, cobbly, or stony	1.00
		Bedrock	0.01	Bedrock	0.01	Bedrock	0.01
SrC:							
Sarnosa	80	Somewhat limited		Not limited		Somewhat limited	
		Droughty	0.65			Droughty	0.65
StB:							
Sinton, frequently flooded	75	Somewhat limited		Somewhat limited		Very limited	
		Flooding	0.50	Flooding	0.50	Flooding	1.00
TaB:							
Tela, occasionally flooded	70	Somewhat limited		Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50	Flooding	0.50
		Flooding	0.50	Flooding	0.50		
Tela, frequently flooded	20	Somewhat limited		Somewhat limited		Very limited	
		Too arid	0.50	Too arid	0.50	Flooding	1.00
		Flooding	0.50	Flooding	0.50		
ToB:							
Tordia	90	Very limited		Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Potentially or highly erodible	1.00	Potentially or highly erodible	1.00	Potentially or highly erodible	1.00
		HEL wind	1.00	Percs slowly	0.50	HEL wind	1.00
		Percs slowly	0.50			Percs slowly	0.50
VeC:							
Verick	80	Very limited		Very limited		Very limited	
		Droughty	1.00	Droughty	1.00	Droughty	1.00
		Bedrock	1.00	Bedrock	1.00	Bedrock	1.00
		Potentially or highly erodible	1.00	Potentially or highly erodible	1.00	Potentially or highly erodible	1.00
		HEL wind	1.00	Excess sodium	1.00	HEL wind	1.00
		Excess Sodium	1.00	Too arid	0.50	Excess Sodium	1.00

Table 12.--Grain and Seed Crops, Domestic Grasses and Legumes, and Irrigated Grain and Seed Crops for Food and Cover for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Grain and Seed Crops For Food and Cover		Domestic Grasses and Legumes for Food and Cover		Irrigated Grain and Seed Crops for Food and Cover	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
VrC:							
Viboras	90	Very limited		Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Percs slowly	1.00	Percs slowly	1.00	Percs slowly	1.00
		Potentially or highly erodible	1.00	Potentially or highly erodible	1.00	Potentially or highly erodible	1.00
		HEL wind	1.00	Excess salt	1.00	HEL wind	1.00
		Droughty	1.00	Excess sodium	1.00	Droughty	1.00
W:							
Water	100	Not rated		Not rated		Not rated	
WbB:							
Webb	85	Very limited		Somewhat limited		Very limited	
		HEL wind	1.00	Too arid	0.50	HEL wind	1.00
		Too arid	0.50				
WeB:							
Weesatche	85	Very limited		Not limited		Very limited	
		HEL wind	1.00			HEL wind	1.00
WeC:							
Weesatche	86	Very limited		Very limited		Very limited	
		Potentially or highly erodible	1.00	Potentially or highly erodible	1.00	Potentially or highly erodible	1.00
		HEL wind	1.00			HEL wind	1.00
		Droughty	0.01			Droughty	0.01
WgC:							
Weigang	87	Very limited		Very limited		Very limited	
		Droughty	1.00	Bedrock	1.00	Droughty	1.00
		Bedrock	1.00	Potentially or highly erodible	1.00	Bedrock	1.00
		Potentially or highly erodible	1.00	Percs slowly	0.84	Potentially or highly erodible	1.00
		HEL wind	1.00	Droughty	0.66	HEL wind	1.00
		Percs slowly	0.84			Percs slowly	0.84
WhC:							
Whitsett	60	Very limited		Very limited		Very limited	
		Potentially or highly erodible	1.00	Potentially or highly erodible	1.00	Potentially or highly erodible	1.00
		HEL wind	1.00	Percs slowly	0.50	HEL wind	1.00
		Droughty	1.00	Bedrock	0.32	Droughty	1.00
		Percs slowly	0.50			Percs slowly	0.50
		Bedrock	0.32			Bedrock	0.32

Table 12.--Grain and Seed Crops, Domestic Grasses and Legumes, and Irrigated Grain and Seed Crops for Food and Cover for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Grain and Seed Crops For Food and Cover		Domestic Grasses and Legumes for Food and Cover		Irrigated Grain and Seed Crops for Food and Cover	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
WPD:							
Whitsett	60	Very limited		Very limited		Very limited	
		Potentially or highly erodible	1.00	Potentially or highly erodible	1.00	Potentially or highly erodible	1.00
		HEL wind	1.00	Percs slowly	0.50	HEL wind	1.00
		Droughty	1.00	Bedrock	0.32	Droughty	1.00
		Percs slowly	0.50			Percs slowly	0.50
		Bedrock	0.32			Bedrock	0.32
Picosa	30	Very limited		Very limited		Very limited	
		Droughty	1.00	Droughty	1.00	Droughty	1.00
		Bedrock	1.00	Bedrock	1.00	Bedrock	1.00
		Potentially or highly erodible	1.00	Potentially or highly erodible	1.00	Potentially or highly erodible	1.00
		HEL wind	1.00			HEL wind	1.00
						Slope	0.03
ZaB:							
Zavala, frequently flooded	60	Very limited		Somewhat limited		Very limited	
		HEL wind	1.00	Flooding	0.50	Flooding	1.00
		Droughty	0.08			HEL wind	1.00
		Flooding	0.50			Droughty	0.08
Zavala, occasionally flooded	20	Very limited		Somewhat limited		Very limited	
		HEL wind	1.00	Flooding	0.50	HEL wind	1.00
		Droughty	0.08			Droughty	0.08
		Flooding	0.50			Flooding	0.50
ZvC:							
Zavco	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Droughty	0.10	Too arid	0.50	Droughty	0.10
		Too arid	0.50				

Table 13.--Irrigated Domestic Grasses and Legumes for Food and Cover, and Habitat for Burrowing Mammals and Reptiles

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Irrigated Domestic Grasses and Legumes for Food and Cover		Habitat for Burrowing Mammals and Reptiles	
		Rating class and limiting features	Value	Rating class and limiting features	Value
AgB:					
Aguilares	80	Very limited Excess salt Excess Sodium	 1.00 0.25	Not limited	
AlB:					
Alet, occasionally flooded	55	Somewhat limited Flooding	 0.50	Very limited Flooding	 1.00
Alet, frequently flooded	20	Very limited Flooding	 1.00	Very limited Flooding	 1.00
AnC:					
Annarose	75	Very limited Potentially or highly erodible	 1.00	Not limited	
ANS:					
Area not surveyed	100	Not rated		Not rated	
BeC:					
Benavides	90	Very limited Potentially or highly erodible	 1.00	Not limited	
BkB:					
Bookout	85	Somewhat limited Too clayey	 0.70	Very limited Too clayey	 1.00
BnB:					
Brennan	70	Very limited Potentially or highly erodible	 1.00	Not limited	
BrB:					
Brundage	80	Very limited Percs slowly Excess salt Potentially or highly erodible Excess Sodium Droughty	 1.00 1.00 1.00 0.83 0.01	Somewhat limited Too clayey	 0.03

Table 13.--Irrigated Domestic Grasses and Legumes for Food and Cover, and Habitat for Burrowing Mammals and Reptiles--Continued

Map symbol and soil name	Pct. of map unit	Irrigated Domestic Grasses and Legumes for Food and Cover		Habitat for Burrowing Mammals and Reptiles	
		Rating class and limiting features	Value	Rating class and limiting features	Value
BsB:					
Brystal	80	Not limited		Not limited	
BuA:					
Buchel, occasionally flooded	85	Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00
		Flooding	0.50	Flooding	1.00
		Percs slowly	0.50		
BzA:					
Buchel, frequently flooded	95	Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00
		Flooding	1.00	Flooding	1.00
		Percs slowly	0.50		
CaB:					
Caid	80	Very limited		Somewhat limited	
		Potentially or highly erodible	1.00	Too clayey	0.19
CbB:					
Campbellton	70	Very limited		Very limited	
		Potentially or highly erodible	1.00	Too clayey	1.00
		Excess Sodium	1.00		
		Excess salt	0.12		
		Too clayey	0.11		
CcB:					
Catarina	90	Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00
		Excess salt	1.00		
		Excess Sodium	0.75		
		Droughty	0.54		
		Percs slowly	0.50		
ChB:					
Chacon	80	Very limited		Very limited	
		Potentially or highly erodible	1.00	Too clayey	1.00
		Percs slowly	0.50		
		Too clayey	0.01		
CkB:					
Choke	70	Somewhat limited		Somewhat limited	
		Too clayey	0.79	Too clayey	0.57

Table 13.--Irrigated Domestic Grasses and Legumes for Food and Cover, and Habitat for Burrowing Mammals and Reptiles--Continued

Map symbol and soil name	Pct. of map unit	Irrigated Domestic Grasses and Legumes for Food and Cover		Habitat for Burrowing Mammals and Reptiles	
		Rating class and limiting features	Value	Rating class and limiting features	Value
ClA:					
Cochina, occasionally flooded	90	Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00
		Excess Sodium	0.99	Flooding	1.00
		Excess salt	0.88		
		Flooding	0.50		
		Percs slowly	0.50		
CmA:					
Cochina, frequently flooded	90	Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00
		Flooding	1.00	Flooding	1.00
		Excess Sodium	0.99		
		Excess salt	0.88		
		Percs slowly	0.50		
CnB:					
Colmena	82	Not limited		Not limited	
CoB:					
Conquista	95	Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00
		Percs slowly	1.00		
		Potentially or highly erodible	1.00		
CpC:					
Copita	80	Very limited		Not limited	
		Potentially or highly erodible	1.00		
		Droughty	0.05		
		Bedrock	0.08		
CtA:					
Coquat, frequently flooded	85	Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00
		Flooding	1.00	Flooding	1.00
		Excess Sodium	0.17		
		Percs slowly	0.50		
CuB:					
Cotulla	70	Very limited		Very limited	
		Potentially or highly erodible	1.00	Too clayey	1.00
		Excess salt	1.00		
		Excess Sodium	0.66		
		Too clayey	0.99		
		Droughty	0.02		

Table 13.--Irrigated Domestic Grasses and Legumes for Food and Cover, and Habitat for Burrowing Mammals and Reptiles--Continued

Map symbol and soil name	Pct. of map unit	Irrigated Domestic Grasses and Legumes for Food and Cover		Habitat for Burrowing Mammals and Reptiles	
		Rating class and limiting features	Value	Rating class and limiting features	Value
CVB:					
Cotulla	70	Very limited		Very limited	
		Excess salt	1.00	Too clayey	1.00
		Excess Sodium	0.66		
		Too clayey	0.99		
		Droughty	0.02		
		Percs slowly	0.50		
Maverick	20	Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00
		Excess salt	1.00		
		Percs slowly	0.50		
		Excess Sodium	0.03		
		Bedrock	0.01		
CyB:					
Coy	90	Somewhat limited		Very limited	
		Too clayey	0.81	Too clayey	1.00
		Percs slowly	0.50		
CZB:					
Czar	60	Not limited		Somewhat limited	
				Too clayey	0.11
				Flooding	0.50
Clareville, rarely flooded	30	Somewhat limited		Somewhat limited	
		Too clayey	0.19	Too clayey	0.99
				Flooding	0.50
DAM:					
Dams	100	Not rated		Not rated	
DsB:					
Dosrios	80	Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00
		Potentially or highly erodible	1.00		
		Excess Sodium	0.03		
		Percs slowly	0.50		
EsB:					
Eloso	70	Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00
		Percs slowly	0.50		
		Bedrock	0.02		

Table 13.--Irrigated Domestic Grasses and Legumes for Food and Cover, and Habitat for Burrowing Mammals and Reptiles--Continued

Map symbol and soil name	Pct. of map unit	Irrigated Domestic Grasses and Legumes for Food and Cover		Habitat for Burrowing Mammals and Reptiles	
		Rating class and limiting features	Value	Rating class and limiting features	Value
EvC:					
Esseville	75	Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00
		Percs slowly	0.50		
		Bedrock	0.14		
FaC:					
Fashing	90	Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00
		Bedrock	1.00	Dense layer	1.00
		Potentially or highly erodible	1.00	10-20" to Bedrock (Hard or Soft)	0.05
		Excess salt	1.00		
		Excess Sodium	0.34		
FoB:					
Floresville, eroded	75	Very limited		Very limited	
		Potentially or highly erodible	1.00	Too clayey	1.00
		Percs slowly	0.33		
HnC:					
Hindes	85	Very limited		Somewhat limited	
		Potentially or highly erodible	1.00	Too gravelly	0.99
		Too gravelly, cobbly, or stony	1.00	Too clayey	0.95
		Droughty	0.74		
		Too clayey	0.11		
HoB:					
Houla	66	Somewhat limited		Not limited	
		Too clayey	0.23		
ImB:					
Imogene, occasionally flooded	80	Very limited		Very limited	
		Potentially or highly erodible	1.00	Flooding	1.00
		Excess salt	1.00		
		Percs slowly	0.99		
		Excess Sodium	0.97		
		Flooding	0.50		
LaB:					
Laparita, rarely flooded	70	Somewhat limited		Very limited	
		Too clayey	0.89	Too clayey	1.00
		Percs slowly	0.50	Flooding	0.50

Table 13.--Irrigated Domestic Grasses and Legumes for Food and Cover, and Habitat for Burrowing Mammals and Reptiles--Continued

Map symbol and soil name	Pct. of map unit	Irrigated Domestic Grasses and Legumes for Food and Cover		Habitat for Burrowing Mammals and Reptiles	
		Rating class and limiting features	Value	Rating class and limiting features	Value
LeB:					
Lasalle	80	Very limited			
		Too clayey	1.00	Too clayey	1.00
		Excess salt	1.00		
		Droughty	0.18		
		Excess Sodium	0.17		
		Percs slowly	0.50		
LnB:					
Leoncita	85	Very limited		Not limited	
		Potentially or highly erodible	1.00		
LoC:					
Lomart	80	Very limited		Not limited	
		Potentially or highly erodible	1.00		
		Droughty	0.32		
		Bedrock	0.92		
MaD:					
Mata	91	Somewhat limited		Somewhat limited	
		Percs slowly	0.50	Too gravelly	0.16
		Too gravelly, cobbly, or stony	0.16	Too clayey	0.11
		Too clayey	0.11		
McC:					
Maverick	80	Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00
		Potentially or highly erodible	1.00		
		Excess salt	1.00		
		Percs slowly	0.50		
		Excess Sodium	0.03		
MgD:					
Mirasol	85	Very limited		Somewhat limited	
		Droughty	1.00	Cemented pan	0.26
		Cemented pan	1.00	Too gravelly	0.02
		Potentially or highly erodible	1.00		
		Too gravelly, cobbly, or stony	1.00		
		Slope	0.12		

Table 13.--Irrigated Domestic Grasses and Legumes for Food and Cover, and Habitat for Burrowing Mammals and Reptiles--Continued

Map symbol and soil name	Pct. of map unit	Irrigated Domestic Grasses and Legumes for Food and Cover		Habitat for Burrowing Mammals and Reptiles	
		Rating class and limiting features	Value	Rating class and limiting features	Value
MoC:					
Moglia	80	Somewhat limited		Somewhat limited	
		Droughty	0.52	Too clayey	0.86
		Excess salt	0.50		
		Excess Sodium	0.34		
		Too clayey	0.50		
MtB:					
Montell	80	Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00
		Excess Sodium	0.06		
		Percs slowly	0.50		
MwA:					
Monwebb, occasionally flooded	80	Very limited		Very limited	
		Too clayey	1.00	Flooding	1.00
		Flooding	0.50	Too clayey	1.00
		Percs slowly	0.50		
OmD:					
Olmedo	90	Very limited		Somewhat limited	
		Droughty	1.00	Too gravelly	0.37
		Cemented pan	1.00	Cemented pan	0.05
		Percs slowly	1.00		
		Potentially or highly erodible	1.00		
		Too gravelly, cobbly, or stony	1.00		
PIT:					
Pits	100	Not rated		Not rated	
PkC:					
Pavelek, severely eroded	70	Very limited		Very limited	
		Droughty	1.00	Too clayey	1.00
		Bedrock	1.00	Depth to permafrost	1.00
		Too clayey	0.95	10-20" to Bedrock (Hard or Soft)	0.61
		Percs slowly	0.17		
PrC:					
Pernitas	90	Very limited		Somewhat limited	
		Potentially or highly erodible	1.00	Too clayey	0.01

Table 13.--Irrigated Domestic Grasses and Legumes for Food and Cover, and Habitat for Burrowing Mammals and Reptiles--Continued

Map symbol and soil name	Pct. of map unit	Irrigated Domestic Grasses and Legumes for Food and Cover		Habitat for Burrowing Mammals and Reptiles	
		Rating class and limiting features	Value	Rating class and limiting features	Value
PtC:					
Pernitas	85	Not limited		Somewhat limited	
				Too clayey	0.36
RNB:					
Rhymes	60	Very limited		Not limited	
		Potentially or highly erodible	1.00		
		Droughty	0.37		
		Too sandy	0.50		
Nusil	30	Very limited		Somewhat limited	
		Potentially or highly erodible	1.00	Too Sandy	0.50
		Droughty	0.18		
		Too sandy	0.50		
RoB:					
Rosenbrock	70	Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00
		Percs slowly	0.50		
SaB:					
Salco	85	Very limited		Not limited	
		Potentially or highly erodible	1.00		
ScD:					
Sancajo	80	Very limited		Somewhat limited	
		Droughty	1.00	Content of large stones	0.78
		Too gravelly, cobbly, or stony	1.00	Too gravelly	0.16
		Bedrock	0.01		
SrC:					
Sarnosa	80	Not limited		Not limited	
StB:					
Sinton, frequently flooded	75	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
TaB:					
Tela, occasionally flooded	70	Somewhat limited		Very limited	
		Flooding	0.50	Flooding	1.00
Tela, frequently flooded	20	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00

Table 13.--Irrigated Domestic Grasses and Legumes for Food and Cover, and Habitat for Burrowing Mammals and Reptiles--Continued

Map symbol and soil name	Pct. of map unit	Irrigated Domestic Grasses and Legumes for Food and Cover		Habitat for Burrowing Mammals and Reptiles	
		Rating class and limiting features	Value	Rating class and limiting features	Value
ToB:					
Tordia	90	Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00
		Potentially or highly erodible	1.00		
		Percs slowly	0.50		
VeC:					
Verick	80	Very limited		Very limited	
		Droughty	1.00	< 10" to Bedrock (Hard or Soft)	1.00
		Bedrock	1.00		
		Potentially or highly erodible	1.00		
		Excess Sodium	1.00		
VrC:					
Viboras	90	Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00
		Percs slowly	1.00		
		Potentially or highly erodible	1.00		
		Excess salt	1.00		
		Droughty	0.58		
W:					
Water	100	Not rated		Not rated	
WbB:					
Webb	85	Not limited		Not limited	
WeB:					
Weesatche	85	Not limited		Somewhat limited	
				Too clayey	0.05
WeC:					
Weesatche	86	Very limited		Somewhat limited	
		Potentially or highly erodible	1.00	Too clayey	0.01
WgC:					
Weigang	87	Very limited		Somewhat limited	
		Bedrock	1.00	10-20" to Bedrock (Hard or Soft)	0.03
		Potentially or highly erodible	1.00		
		Percs slowly	0.84		
		Droughty	0.66		
WhC:					
Whitsett	60	Very limited		Somewhat limited	
		Potentially or highly erodible	1.00	Too clayey	0.57
		Percs slowly	0.50		
		Bedrock	0.32		

Table 13.--Irrigated Domestic Grasses and Legumes for Food and Cover, and Habitat for Burrowing Mammals and Reptiles--Continued

Map symbol and soil name	Pct. of map unit	Irrigated Domestic Grasses and Legumes for Food and Cover		Habitat for Burrowing Mammals and Reptiles	
		Rating class and limiting features	Value	Rating class and limiting features	Value
WPD:					
Whitsett	60	Very limited		Somewhat limited	
		Potentially or highly erodible	1.00	Too clayey	0.57
		Percs slowly	0.50		
		Bedrock	0.32		
Picosa	30	Very limited		Very limited	
		Droughty	1.00	< 10" to Bedrock (Hard or Soft)	1.00
		Bedrock	1.00		
		Potentially or highly erodible	1.00		
		Slope	0.03		
ZaB:					
Zavala, frequently flooded	60	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
Zavala, occasionally flooded	20	Somewhat limited		Very limited	
		Flooding	0.50	Flooding	1.00
ZvC:					
Zavco	90	Not limited		Somewhat limited	
				Too clayey	0.81

Table 14.--Upland Native Herbaceous Plants, and Upland Shrubs and Vines for Wildlife Habitat

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Upland Native Herbaceous Plants		Upland Shrubs and Vines	
		Rating class and limiting features	Value	Rating class and limiting features	Value
AgB:					
Aguilares	80	Very limited		Somewhat limited	
		Excess sodium	1.00	Excess salt	0.50
		Excess salt	0.50	Excess Sodium	0.25
				Extreme soil temperatures	0.50
AlB:					
Alet, occasionally flooded	55	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
Alet, frequently flooded	20	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
AnC:					
Annarose	75	Not limited		Very limited	
				Bedrock	1.00
				Extreme soil temperatures	0.50
ANS:					
Area not surveyed	100	Not rated		Not rated	
BeC:					
Benavides	90	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
BkB:					
Bookout	85	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
BnB:					
Brennan	70	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
BrB:					
Brundage	80	Very limited		Somewhat limited	
		Excess sodium	1.00	Excess Sodium	0.83
		Excess salt	0.78	Excess salt	0.78
				Extreme soil temperatures	0.50

Table 14.--Upland Native Herbaceous Plants, and Upland Shrubs and Vines for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Upland Native Herbaceous Plants		Upland Shrubs and Vines	
		Rating class and limiting features	Value	Rating class and limiting features	Value
BsB:					
Brystal	80	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
BuA:					
Buchel, occasionally flooded	85	Somewhat limited		Somewhat limited	
		Too clayey	0.50	Too clayey	0.50
				Extreme soil temperatures	0.50
BzA:					
Buchel, frequently flooded	95	Somewhat limited		Somewhat limited	
		Too clayey	0.50	Too clayey	0.50
				Extreme soil temperatures	0.50
CaB:					
Caid	80	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
CbB:					
Campbellton	70	Very limited		Very limited	
		Excess sodium	1.00	Bedrock	1.00
		Excess salt	0.01	Excess Sodium	1.00
				Extreme soil temperatures	0.50
				Excess salt	0.01
CcB:					
Catarina	90	Very limited		Somewhat limited	
		Excess sodium	1.00	Excess Sodium	0.75
		Excess salt	0.50	Excess salt	0.50
		Too clayey	0.50	Too clayey	0.50
				Extreme soil temperatures	0.50
ChB:					
Chacon	80	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
CkB:					
Choke	70	Not limited		Very limited	
				Bedrock	1.00
				Extreme soil temperatures	0.50

Table 14.--Upland Native Herbaceous Plants, and Upland Shrubs and Vines for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Upland Native Herbaceous Plants		Upland Shrubs and Vines	
		Rating class and limiting features	Value	Rating class and limiting features	Value
ClA:					
Cochina, occasionally flooded	90	Very limited		Somewhat limited	
		Excess sodium	1.00	Excess Sodium	0.99
		Excess salt	0.12	Excess salt	0.12
		Too clayey	0.50	Too clayey	0.50
				Extreme soil temperatures	0.50
CmA:					
Cochina, frequently flooded	90	Very limited		Somewhat limited	
		Excess sodium	1.00	Excess Sodium	0.99
		Excess salt	0.12	Excess salt	0.12
		Too clayey	0.50	Too clayey	0.50
				Extreme soil temperatures	0.50
CnB:					
Colmena	82	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
CoB:					
Conquista	95	Somewhat limited		Somewhat limited	
		Too clayey	0.50	Too clayey	0.50
				Extreme soil temperatures	0.50
CpC:					
Copita	80	Not limited		Somewhat limited	
				Bedrock	0.98
				Extreme soil temperatures	0.50
CtA:					
Coquat, frequently flooded	85	Very limited		Somewhat limited	
		Excess sodium	1.00	Excess Sodium	0.17
		Too clayey	0.50	Too clayey	0.50
				Extreme soil temperatures	0.50
CuB:					
Cotulla	70	Very limited		Somewhat limited	
		Excess sodium	1.00	Excess Sodium	0.66
		Excess salt	0.50	Excess salt	0.50
				Extreme soil temperatures	0.50

Table 14.--Upland Native Herbaceous Plants, and Upland Shrubs and Vines for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Upland Native Herbaceous Plants		Upland Shrubs and Vines	
		Rating class and limiting features	Value	Rating class and limiting features	Value
CVB:					
Cotulla	70	Very limited		Somewhat limited	
		Excess sodium	1.00	Excess Sodium	0.66
		Excess salt	0.50	Excess salt	0.50
				Extreme soil temperatures	0.50
Maverick	20	Very limited		Very limited	
		Excess sodium	1.00	Bedrock	1.00
		Excess salt	0.50	Excess salt	0.50
		Too clayey	0.50	Too clayey	0.50
				Extreme soil temperatures	0.50
				Excess Sodium	0.03
CyB:					
Coy	90	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
CZB:					
Czar	60	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
Clareville, rarely flooded	30	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
DAM:					
Dams	100	Not rated		Not rated	
DsB:					
Dosrios	80	Very limited		Somewhat limited	
		Excess sodium	1.00	Excess Sodium	0.03
		Too clayey	0.50	Too clayey	0.50
				Extreme soil temperatures	0.50
EsB:					
Eloso	70	Somewhat limited		Somewhat limited	
		Too clayey	0.50	Bedrock	0.99
				Too clayey	0.50
				Extreme soil temperatures	0.50
EvC:					
Esseville	75	Somewhat limited		Somewhat limited	
		Excess sodium	0.08	Bedrock	0.96
		Too clayey	0.50	Too clayey	0.50
				Extreme soil temperatures	0.50

Table 14.--Upland Native Herbaceous Plants, and Upland Shrubs and Vines for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Upland Native Herbaceous Plants		Upland Shrubs and Vines	
		Rating class and limiting features	Value	Rating class and limiting features	Value
FaC:					
Fashing	90	Very limited		Somewhat limited	
		Excess sodium	1.00	Excess salt	0.47
		Excess salt	0.47	Excess Sodium	0.34
		Too clayey	0.50	Too clayey	0.50
				Extreme soil temperatures	0.50
				Bedrock	0.32
FoB:					
Floresville, eroded	75	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
HnC:					
Hindes	85	Somewhat limited		Somewhat limited	
		Too gravelly, cobbly, or stony	0.77	Too gravelly, cobbly, or stony	0.77
				Extreme soil temperatures	0.50
HoB:					
Houla	66	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
ImB:					
Imogene, occasionally flooded	80	Very limited		Somewhat limited	
		Excess sodium	1.00	Excess Sodium	0.97
		Excess salt	0.22	Excess salt	0.22
				Extreme soil temperatures	0.50
LaB:					
Laparita, rarely flooded	70	Somewhat limited		Somewhat limited	
		Excess sodium	0.03	Extreme soil temperatures	0.50
LeB:					
Lasalle	80	Very limited		Somewhat limited	
		Excess sodium	1.00	Excess salt	0.78
		Excess salt	0.78	Excess Sodium	0.17
		Too clayey	0.50	Too clayey	0.50
				Extreme soil temperatures	0.50
LnB:					
Leoncita	85	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50

Table 14.--Upland Native Herbaceous Plants, and Upland Shrubs and Vines for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Upland Native Herbaceous Plants		Upland Shrubs and Vines	
		Rating class and limiting features	Value	Rating class and limiting features	Value
LoC:					
Lomart	80	Not limited		Somewhat limited	
				Bedrock	0.60
				Extreme soil temperatures	0.50
MaD:					
Mata	91	Not limited		Very limited	
				Bedrock	1.00
				Extreme soil temperatures	0.50
McC:					
Maverick	80	Very limited		Very limited	
		Excess sodium	1.00	Bedrock	1.00
		Excess salt	0.50	Excess salt	0.50
		Too clayey	0.50	Too clayey	0.50
				Extreme soil temperatures	0.50
				Excess Sodium	0.03
MgD:					
Mirasol	85	Somewhat limited		Somewhat limited	
		Too gravelly, cobbly, or stony	0.01	Cemented pan	0.76
		Droughty	0.50	Too gravelly, cobbly, or stony	0.01
				Extreme soil temperatures	0.50
				Droughty	0.50
MoC:					
Moglia	80	Very limited		Somewhat limited	
		Excess sodium	1.00	Excess Sodium	0.34
		Excess salt	0.06	Extreme soil temperatures	0.50
				Excess salt	0.06
MtB:					
Montell	80	Very limited		Somewhat limited	
		Excess sodium	1.00	Excess Sodium	0.06
		Too clayey	0.50	Too clayey	0.50
				Extreme soil temperatures	0.50
MwA:					
Monwebb, occasionally flooded	80	Somewhat limited		Somewhat limited	
		Too clayey	0.50	Too clayey	0.50
				Extreme soil temperatures	0.50

Table 14.--Upland Native Herbaceous Plants, and Upland Shrubs and Vines for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Upland Native Herbaceous Plants		Upland Shrubs and Vines	
		Rating class and limiting features	Value	Rating class and limiting features	Value
OmD:					
Olmedo	90	Somewhat limited		Somewhat limited	
		Too gravelly, cobbly, or stony	0.26	Too gravelly, cobbly, or stony	0.26
		Droughty	0.50	Cemented pan	0.68
				Droughty	0.50
				Extreme soil temperatures	0.50
PIT:					
Pits	100	Not rated		Not rated	
PkC:					
Pavelek, severely eroded	70	Somewhat limited		Somewhat limited	
		Droughty	0.50	Extreme soil temperatures	0.50
				Droughty	0.50
				Bedrock	0.17
PrC:					
Pernitas	90	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
PtC:					
Pernitas	85	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
RNB:					
Rhymes	60	Somewhat limited		Somewhat limited	
		Sandy surface	0.40	Extreme soil temperatures	0.50
				Sandy surface	0.40
Nusil	30	Somewhat limited		Somewhat limited	
		Sandy surface	0.40	Extreme soil temperatures	0.50
				Sandy surface	0.40
RoB:					
Rosenbrock	70	Somewhat limited		Very limited	
		Too clayey	0.50	Bedrock	1.00
				Too clayey	0.50
				Extreme soil temperatures	0.50
SaB:					
Salco	85	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50

Table 14.--Upland Native Herbaceous Plants, and Upland Shrubs and Vines for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Upland Native Herbaceous Plants		Upland Shrubs and Vines	
		Rating class and limiting features	Value	Rating class and limiting features	Value
ScD:					
Sancajo	80	Somewhat limited		Very limited	
		Too gravelly, cobbly, or stony	0.26	Bedrock	1.00
		Droughty	0.50	Too gravelly, cobbly, or stony	0.26
				Droughty	0.50
				Extreme soil temperatures	0.50
SrC:					
Sarnosa	80	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
StB:					
Sinton, frequently flooded	75	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
TaB:					
Tela, occasionally flooded	70	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
Tela, frequently flooded	20	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
ToB:					
Tordia	90	Somewhat limited		Very limited	
		Too clayey	0.50	Bedrock	1.00
				Too clayey	0.50
				Extreme soil temperatures	0.50
VeC:					
Verick	80	Very limited		Very limited	
		Excess sodium	1.00	Excess Sodium	1.00
		Droughty	0.50	Droughty	0.50
				Extreme soil temperatures	0.50
				Bedrock	0.03
VrC:					
Viboras	90	Very limited		Somewhat limited	
		Excess sodium	1.00	Excess salt	0.50
		Excess salt	0.50	Bedrock	0.79
		Too clayey	0.50	Too clayey	0.50
				Extreme soil temperatures	0.50

Table 14.--Upland Native Herbaceous Plants, and Upland Shrubs and Vines for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Upland Native Herbaceous Plants		Upland Shrubs and Vines	
		Rating class and limiting features	Value	Rating class and limiting features	Value
W:					
Water	100	Not rated		Not rated	
WbB:					
Webb	85	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
WeB:					
Weesatche	85	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
WeC:					
Weesatche	86	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
WgC:					
Weigang	87	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
				Bedrock	0.34
WhC:					
Whitsett	60	Not limited		Somewhat limited	
				Bedrock	0.90
				Extreme soil temperatures	0.50
WPD:					
Whitsett	60	Not limited		Somewhat limited	
				Bedrock	0.90
				Extreme soil temperatures	0.50
Picosa	30	Somewhat limited		Somewhat limited	
		Droughty	0.50	Droughty	0.50
				Extreme soil temperatures	0.50
				Bedrock	0.03
ZaB:					
Zavala, frequently flooded	60	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
Zavala, occasionally flooded	20	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
ZvC:					
Zavco	90	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50

Table 15.--Riparian Herbaceous Plants, Riparian Shrubs, Vines, and Trees, and Freshwater Wetland Plants for Wildlife Habitat

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Riparian Herbaceous Plants		Riparian Shrubs, Vines, and Trees		Freshwater Wetland Plants	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AgB:							
Aguilares	80	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
AlB:							
Alet, occasionally flooded	55	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
Alet, frequently flooded	20	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
AnC:							
Annarose	75	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
ANS:							
Area not surveyed	100	Not rated		Not rated		Not rated	
BeC:							
Benavides	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
BkB:							
Bookout	85	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
BnB:							
Brennan	70	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
BrB:							
Brundage	80	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00	Droughty	0.01		

Table 15.--Riparian Herbaceous Plants, Riparian Shrubs, Vines, and Trees, and Freshwater Wetland Plants for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Riparian Herbaceous Plants		Riparian Shrubs, Vines, and Trees		Freshwater Wetland Plants	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
BsB: Brystal	80	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
BuA: Buchel, occasionally flooded	85	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
BzA: Buchel, frequently flooded	95	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
CaB: Caid	80	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
CbB: Campbellton	70	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
CcB: Catarina	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00	Droughty	0.54	Excess salt	1.00
		Excess sodium	0.05	Excess sodium	0.11	Excess sodium	1.00
ChB: Chacon	80	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
CkB: Choke	70	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
ClA: Cochina, occasionally flooded	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00	Excess sodium	0.98	Excess sodium	1.00
		Excess sodium	0.70				

Table 15.--Riparian Herbaceous Plants, Riparian Shrubs, Vines, and Trees, and Freshwater Wetland Plants for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Riparian Herbaceous Plants		Riparian Shrubs, Vines, and Trees		Freshwater Wetland Plants	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CmA:							
Cochina, frequently flooded	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Excess sodium	0.70	Excess sodium	0.98	Excess sodium	1.00
CnB:							
Colmena	82	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
CoB:							
Conquista	95	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
CpC:							
Copita	80	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00	Droughty	0.05		
CtA:							
Coquat, frequently flooded	85	Very limited		Somewhat limited		Very limited	
		Too dry	1.00	Too dry	0.91	Too dry	1.00
CuB:							
Cotulla	70	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00	Droughty	0.02		
CVB:							
Cotulla	70	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00	Excess sodium	0.43	Excess sodium	1.00
		Excess sodium	0.20	Droughty	0.02		
Maverick	20	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00	Excess sodium	0.11	Excess sodium	1.00
		Excess sodium	0.05			Excess salt	0.55
CyB:							
Coy	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				

Table 15.--Riparian Herbaceous Plants, Riparian Shrubs, Vines, and Trees, and Freshwater Wetland Plants for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Riparian Herbaceous Plants		Riparian Shrubs, Vines, and Trees		Freshwater Wetland Plants	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CZB:							
Czar	60	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
Clareville, rarely flooded	30	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
DAM:							
Dams	100	Not rated		Not rated		Not rated	
DsB:							
Dosrios	80	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
EsB:							
Eloso	70	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
EvC:							
Esseville	75	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
FaC:							
Fashing	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00	Droughty	0.06		
FoB:							
Floresville, eroded	75	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
HnC:							
Hindes	85	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00	Droughty	0.74		
		Too gravelly, cobbly, or stony	1.00				

Table 15.--Riparian Herbaceous Plants, Riparian Shrubs, Vines, and Trees, and Freshwater Wetland Plants for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Riparian Herbaceous Plants		Riparian Shrubs, Vines, and Trees		Freshwater Wetland Plants	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
HoB: Houla	66	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
ImB: Imogene, occasionally flooded	80	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
LaB: Laparita, rarely flooded	70	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00			Excess sodium	0.10
LeB: Lasalle	80	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00	Excess sodium	0.43	Excess sodium	1.00
		Excess sodium	0.20	Droughty	0.18		
LnB: Leoncita	85	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
LoC: Lomart	80	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00	Droughty	0.32		
MaD: Mata	91	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
McC: Maverick	80	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00	Excess sodium	0.11	Excess sodium	1.00
		Excess sodium	0.05			Excess salt	0.55

Table 15.--Riparian Herbaceous Plants, Riparian Shrubs, Vines, and Trees, and Freshwater Wetland Plants for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Riparian Herbaceous Plants		Riparian Shrubs, Vines, and Trees		Freshwater Wetland Plants	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
MgD:							
Mirasol	85	Very limited		Very limited		Very limited	
		Too dry	1.00	Droughty	1.00	Too dry	1.00
		Infrequent flooding	1.00	Too dry	1.00		
		Too gravelly, cobbly, or stony	0.05				
MoC:							
Moglia	80	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00	Droughty	0.52		
MtB:							
Montell	80	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
MwA:							
Monwebb, occasionally flooded	80	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
OmD:							
Olmedo	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Droughty	1.00	Too dry	1.00
		Infrequent flooding	1.00	Too dry	1.00		
		Too gravelly, cobbly, or stony	0.84				
PIT:							
Pits	100	Not rated		Not rated		Very limited	
						Too dry	1.00
						Excess salt	1.00
PkC:							
Pavelek, severely eroded	70	Very limited		Very limited		Very limited	
		Too dry	1.00	Droughty	1.00	Too dry	1.00
		Infrequent flooding	1.00	Too dry	1.00		
PrC:							
Pernitas	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				

Table 15.--Riparian Herbaceous Plants, Riparian Shrubs, Vines, and Trees, and Freshwater Wetland Plants for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Riparian Herbaceous Plants		Riparian Shrubs, Vines, and Trees		Freshwater Wetland Plants	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
PtC:							
Pernitas	85	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
RNB:							
Rhymes	60	Very limited		Very limited		Very limited	
		Too sandy	1.00	Too dry	1.00	Too dry	1.00
		Too dry	1.00	Droughty	0.37	Too sandy	0.50
		Infrequent flooding	1.00				
Nusil	30	Very limited		Very limited		Very limited	
		Too sandy	1.00	Too dry	1.00	Too dry	1.00
		Too dry	1.00	Droughty	0.18	Too sandy	0.50
		Infrequent flooding	1.00				
RoB:							
Rosenbrock	70	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
SaB:							
Salco	85	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
ScD:							
Sancajo	80	Very limited		Very limited		Very limited	
		Too dry	1.00	Droughty	1.00	Too dry	1.00
		Infrequent flooding	1.00	Too dry	1.00		
		Too gravelly, cobbly, or stony	0.84				
SrC:							
Sarnosa	80	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
StB:							
Sinton, frequently flooded	75	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
TaB:							
Tela, occasionally flooded	70	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				

Table 15.--Riparian Herbaceous Plants, Riparian Shrubs, Vines, and Trees, and Freshwater Wetland Plants for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Riparian Herbaceous Plants		Riparian Shrubs, Vines, and Trees		Freshwater Wetland Plants	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Tela, frequently flooded	20	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
ToB:							
Tordia	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
VeC:							
Verick	80	Very limited		Very limited		Very limited	
		Too dry	1.00	Droughty	1.00	Too dry	1.00
		Infrequent flooding	1.00	Too dry	1.00		
VrC:							
Viboras	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00	Droughty	0.58	Excess salt	1.00
		Excess salt	0.14	Excess salt	0.14		
W:							
Water	100	Not rated		Not rated		Not rated	
WbB:							
Webb	85	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
WeB:							
Weesatche	85	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
WeC:							
Weesatche	86	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
WgC:							
Weigang	87	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00	Droughty	0.66		
WhC:							
Whitsett	60	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				

Table 15.--Riparian Herbaceous Plants, Riparian Shrubs, Vines, and Trees, and Freshwater Wetland Plants for Wildlife Habitat--Continued

Map symbol and soil name	Pct. of map unit	Riparian Herbaceous Plants		Riparian Shrubs, Vines, and Trees		Freshwater Wetland Plants	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
WPD:							
Whitsett	60	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
Picosa	30	Very limited		Very limited		Very limited	
		Too dry	1.00	Droughty	1.00	Too dry	1.00
		Infrequent flooding	1.00	Too dry	1.00		
ZaB:							
Zavala, frequently flooded	60	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
Zavala, occasionally flooded	20	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
ZvC:							
Zavco	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				

Table 16.--Camp Areas, Picnic Areas, and Playgrounds

(The information in this table indicates the dominant soil condition but does not eliminate the need for investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AgB:							
Aguilares	80	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
						Gravel	0.05
AlB:							
Alet, occasionally Flooded	55	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60
Alet, frequently Flooded	20	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Flooding	0.40	Flooding	1.00
AnC:							
Annarose	75	Not limited		Not limited		Somewhat limited	
						Slope	0.12
ANS:							
Area not surveyed	100	Not rated		Not rated		Not rated	
BeC:							
Benavides	90	Not limited		Not limited		Somewhat limited	
						Slope	0.28
BkB:							
Bookout	85	Not limited		Not limited		Not limited	
BnB:							
Brennan	70	Not limited		Not limited		Not limited	
BrB:							
Brundage	80	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Slow water movement	0.45	Slow water movement	0.45	Slow water movement	0.45
BsB:							
Brystal	80	Not limited		Not limited		Not limited	
BuA:							
Buchel, occasionally flooded	85	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Too clayey	0.50	Flooding	0.60
		Too clayey	0.50	Slow water movement	0.45	Too clayey	0.50
		Slow water movement	0.45			Slow water movement	0.45

Table 16.--Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
BzA:							
Buchel, frequently Flooded	95	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Too clayey	0.50	Flooding	1.00
		Too clayey	0.50	Slow water movement	0.45	Too clayey	0.50
		Slow water movement	0.45	Flooding	0.40	Slow water movement	0.45
CaB:							
Caid	80	Not limited		Not limited		Not limited	
CbB:							
Campbellton	70	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
CcB:							
Catarina	90	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Too clayey	0.50	Too clayey	0.50	Too clayey	0.50
		Slow water movement	0.45	Slow water movement	0.45	Slow water movement	0.45
ChB:							
Chacon	80	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Slow water movement	0.45	Slow water movement	0.45	Slow water movement	0.45
CkB:							
Choke	70	Not limited		Not limited		Not limited	
ClA:							
Cochina, occasionally flooded	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Sodium content	1.00	Sodium content	1.00
		Sodium content	1.00	Too clayey	0.50	Gravel	0.06
		Too clayey	0.50	Slow water movement	0.45	Flooding	0.60
		Slow water movement	0.45			Too clayey	0.50
						Slow water movement	0.45
CmA:							
Cochina, frequently flooded	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Sodium content	1.00	Flooding	1.00
		Sodium content	1.00	Too clayey	0.50	Sodium content	1.00
		Too clayey	0.50	Slow water movement	0.45	Gravel	0.06
		Slow water movement	0.45	Flooding	0.40	Too clayey	0.50
						Slow water movement	0.45
CnB:							
Colmena	82	Not limited		Not limited		Not limited	

Table 16.--Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CoB:							
Conquista	95	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.50	Too clayey	0.50	Too clayey	0.50
		Slow water movement	0.45	Slow water movement	0.45	Slow water movement	0.45
CpC:							
Copita	80	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.08
						Slope	0.03
CtA:							
Coquat, frequently flooded	85	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Flooding	1.00	Too clayey	0.50	Flooding	1.00
		Too clayey	0.50	Slow water movement	0.45	Too clayey	0.50
		Slow water movement	0.45	Flooding	0.40	Slow water movement	0.45
CuB:							
Cotulla	70	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Slow water movement	0.45	Slow water movement	0.45	Gravel	0.06
						Slow water movement	0.45
CVB:							
Cotulla	70	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Slow water movement	0.45	Slow water movement	0.45	Gravel	0.06
						Slow water movement	0.45
Maverick	20	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Too clayey	0.50	Too clayey	0.50	Gravel	0.50
		Slow water movement	0.39	Slow water movement	0.39	Too clayey	0.50
						Slow water movement	0.39
CyB:							
Coy	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.45	Slow water movement	0.45	Slow water movement	0.45
CZB:							
Czar	60	Very limited		Not limited		Not limited	
		Flooding	1.00				
Clareville, rarely flooded	30	Very limited		Very limited		Very limited	
		Flooding	1.00	Sodium content	1.00	Sodium content	1.00
		Sodium content	1.00				

Table 16.--Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
DAM:							
Dams	100	Not rated		Not rated		Not rated	
DsB:							
Dosrios	80	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Too clayey	0.50	Too clayey	0.50	Too clayey	0.50
		Slow water movement	0.45	Slow water movement	0.45	Slow water movement	0.45
EsB:							
Eloso	70	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.50	Too clayey	0.50	Too clayey	0.50
		Slow water movement	0.45	Slow water movement	0.45	Slow water movement	0.45
EvC:							
Esseville	75	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Too clayey	0.50	Too clayey	0.50	Depth to bedrock	0.14
		Slow water movement	0.45	Slow water movement	0.45	Slope	0.03
						Too clayey	0.50
						Slow water movement	0.45
FaC:							
Fashing	90	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Too clayey	0.50	Too clayey	0.50	Slope	0.03
		Slow water movement	0.39	Slow water movement	0.39	Too clayey	0.50
						Slow water movement	0.39
FoB:							
Floresville, eroded	75	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.39	Slow water movement	0.39	Slow water movement	0.39
HnC:							
Hindes	85	Very limited		Very limited		Very limited	
		Gravel	1.00	Gravel	1.00	Gravel	1.00
						Slope	0.28
HoB:							
Houla	66	Not limited		Not limited		Not limited	
ImB:							
Imogene, occasionally flooded	80	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Flooding	1.00	Slow water movement	0.45	Flooding	0.60
		Slow water movement	0.45	Too sandy	0.17	Slow water movement	0.45
		Too sandy	0.17			Too sandy	0.17

Table 16.--Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
LaB:							
Laparita, rarely flooded	70	Very limited		Very limited		Very limited	
		Flooding	1.00	Sodium content	1.00	Sodium content	1.00
		Sodium content	1.00	Slow water movement	0.45	Slow water movement	0.45
		Slow water movement	0.45				
LeB:							
Lasalle	80	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Too clayey	0.50	Too clayey	0.50	Gravel	0.06
		Slow water movement	0.45	Slow water movement	0.45	Too clayey	0.50
						Slow water movement	0.45
LnB:							
Leoncita	85	Not limited		Not limited		Not limited	
LoC:							
Lomart	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Depth to bedrock	0.92
						Slope	0.03
						Dusty	0.50
MaD:							
Mata	91	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Gravel	1.00
		Gravel	0.05	Gravel	0.05	Sodium content	1.00
		Slow water movement	0.41	Slow water movement	0.41	Slope	0.03
						Slow water movement	0.41
McC:							
Maverick	80	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Too clayey	0.50	Too clayey	0.50	Gravel	0.50
		Slow water movement	0.39	Slow water movement	0.39	Depth to bedrock	0.01
						Slope	0.12
						Too clayey	0.50
MgD:							
Mirasol	85	Very limited		Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00	Gravel	1.00
		Gravel	1.00	Gravel	1.00	Depth to cemented pan	1.00
						Slope	0.88
MoC:							
Moglia	80	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00

Table 16.--Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
MtB:							
Montell	80	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Too clayey	0.50	Too clayey	0.50	Too clayey	0.50
		Slow water movement	0.45	Slow water movement	0.45	Slow water movement	0.45
MwA:							
Monwebb, occasionally flooded	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Sodium content	1.00	Sodium content	1.00
		Sodium content	1.00	Too clayey	0.50	Flooding	0.60
		Too clayey	0.50	Slow water movement	0.45	Too clayey	0.50
		Slow water movement	0.45			Slow water movement	0.45
OmD:							
Olmedo	90	Very limited		Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00	Gravel	1.00
		Gravel	0.99	Gravel	0.99	Depth to cemented pan	1.00
		Slow water movement	0.45	Slow water movement	0.45	Slope	0.88
						Slow water movement	0.45
PIT:							
Pits	100	Not rated		Not rated		Not rated	
PkC:							
Pavelek, severely eroded	70	Very limited		Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00	Depth to cemented pan	1.00
		Slow water movement	0.39	Slow water movement	0.39	Gravel	0.06
						Slope	0.50
						Slow water movement	0.39
PrC:							
Pernitas	90	Not limited		Not limited		Not limited	
PtC:							
Pernitas	85	Not limited		Not limited		Somewhat limited	
						Slope	0.12
RNB:							
Rhymes	60	Very limited		Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00	Too sandy	1.00
Nusil	30	Very limited		Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00	Too sandy	1.00

Table 16.--Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
RoB:							
Rosenbrock	70	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.50	Too clayey	0.50	Too clayey	0.50
		Slow water movement	0.45	Slow water movement	0.45	Slow water movement	0.45
SaB:							
Salco	85	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
						Gravel	0.54
ScD:							
Sancajo	80	Very limited		Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00	Gravel	1.00
		Gravel	0.99	Gravel	0.99	Depth to cemented pan	1.00
						Slope	0.03
SrC:							
Sarnosa	80	Not limited		Not limited		Somewhat limited	
						Slope	0.28
StB:							
Sinton, frequently flooded	75	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Flooding	0.40	Flooding	1.00
TaB:							
Tela, occasionally flooded	70	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60
Tela, frequently flooded	20	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Flooding	0.40	Flooding	1.00
ToB:							
Tordia	90	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Too clayey	0.50	Too clayey	0.50	Too clayey	0.50
		Slow water movement	0.45	Slow water movement	0.45	Slow water movement	0.45
						Slope	0.03
VeC:							
Verick	80	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Too sandy	0.02	Too sandy	0.02	Slope	0.28
						Too sandy	0.02
VrC:							
Viboras	90	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Salinity	0.13	Salinity	0.13	Depth to bedrock	0.65
		Too clayey	0.50	Too clayey	0.50	Salinity	0.13
		Slow water movement	0.45	Slow water movement	0.45	Slope	0.12
						Too clayey	0.50

Table 16.--Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
W:							
Water	100	Not rated		Not rated		Not rated	
WbB:							
Webb	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
WeB:							
Weesatche	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.40	Too sandy	0.40	Too sandy	0.40
WeC:							
Weesatche	86	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.40	Too sandy	0.40	Slope	0.50
						Too sandy	0.40
WgC:							
Weigang	87	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slow water movement	0.44	Slow water movement	0.44	Gravel	0.04
						Slope	0.03
						Slow water movement	0.44
WhC:							
Whitsett	60	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.41	Slow water movement	0.41	Depth to bedrock	0.32
						Slope	0.12
						Slow water movement	0.41
WPD:							
Whitsett	60	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.41	Slow water movement	0.41	Slow water movement	0.41
Picosa	30	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
						Slope	0.72
						Gravel	0.41
ZaB:							
Zavala, frequently flooded	60	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Flooding	0.40	Flooding	1.00
Zavala, occasionally flooded	20	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60
ZvC:							
Zavco	90	Not limited		Not limited		Somewhat limited	
						Slope	0.03

Table 17.--Paths, Trails, and Golf Course Fairways

(The information in this table indicates the dominant soil condition but does not eliminate the need for need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf course fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AgB:							
Aguilares-----------	80	Not limited		Not limited		Very limited	
						Sodium content	1.00
						Droughty	0.01
AlB:							
Alet, occasionally flooded-------------	55	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
Alet, frequently flooded------------	20	Somewhat limited		Somewhat limited		Very limited	
		Flooding	0.40	Flooding	0.40	Flooding	1.00
AnC:							
Annarose------------	75	Not limited		Not limited		Not limited	
ANS:							
Area not surveyed---	100	Not rated		Not rated		Not rated	
BeC:							
Benavides-----------	90	Not limited		Not limited		Not limited	
BkB:							
Bookout-------------	85	Not limited		Not limited		Not limited	
BnB:							
Brennan-------------	70	Not limited		Not limited		Not limited	
BrB:							
Brundage------------	80	Not limited		Not limited		Very limited	
						Sodium content	1.00
						Droughty	0.01
BsB:							
Brystal-------------	80	Not limited		Not limited		Not limited	
BuA:							
Buchel, occasionally flooded------------	85	Somewhat limited		Somewhat limited		Very limited	
		Too clayey	0.50	Too clayey	0.50	Too clayey	1.00
						Flooding	0.60
BzA:							
Buchel, frequently flooded------------	95	Somewhat limited		Somewhat limited		Very limited	
		Too clayey	0.50	Too clayey	0.50	Flooding	1.00
		Flooding	0.40	Flooding	0.40	Too clayey	1.00
CaB:							
Caid----------------	80	Not limited		Not limited		Not limited	

Table 17.--Paths, Trails, and Golf Course Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf course fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CbB:							
Campbellton	70	Not limited		Not limited		Very limited	
						Sodium content	1.00
CcB:							
Catarina	90	Somewhat limited		Somewhat limited		Very limited	
		Too clayey	0.50	Too clayey	0.50	Sodium content	1.00
						Too clayey	1.00
						Droughty	0.56
ChB:							
Chacon	80	Not limited		Not limited		Very limited	
						Sodium content	1.00
CkB:							
Choke	70	Not limited		Not limited		Not limited	
ClA:							
Cochina, occasionally flooded	90	Somewhat limited		Somewhat limited		Very limited	
		Too clayey	0.50	Too clayey	0.50	Too clayey	1.00
						Sodium content	1.00
						Flooding	0.60
CmA:							
Cochina, frequently flooded	90	Somewhat limited		Somewhat limited		Very limited	
		Too clayey	0.50	Too clayey	0.50	Flooding	1.00
		Flooding	0.40	Flooding	0.40	Too clayey	1.00
						Sodium content	1.00
CnB:							
Colmena	82	Not limited		Not limited		Not limited	
CoB:							
Conquista	95	Somewhat limited		Somewhat limited		Very limited	
		Too clayey	0.50	Too clayey	0.50	Too clayey	1.00
CpC:							
Copita	80	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.08
						Droughty	0.06
CtA:							
Coquat, frequently flooded	85	Somewhat limited		Somewhat limited		Very limited	
		Too clayey	0.50	Too clayey	0.50	Flooding	1.00
		Flooding	0.40	Flooding	0.40	Too clayey	1.00
						Sodium content	1.00
CuB:							
Cotulla	70	Not limited		Not limited		Very limited	
						Sodium content	1.00
						Droughty	0.03

Table 17.--Paths, Trails, and Golf Course Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf course fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CVB:							
Cotulla	70	Not limited		Not limited		Very limited	
						Sodium content	1.00
						Droughty	0.03
Maverick	20	Somewhat limited		Somewhat limited		Very limited	
		Too clayey	0.50	Too clayey	0.50	Sodium content	1.00
						Too clayey	1.00
						Depth to bedrock	0.01
CyB:							
Coy	90	Not limited		Not limited		Not limited	
CZB:							
Czar	60	Not limited		Not limited		Not limited	
Clareville, rarely flooded	30	Not limited		Not limited		Very limited	
						Sodium content	1.00
DAM:							
Dams	100	Not rated		Not rated		Not rated	
DsB:							
Dosrios	80	Somewhat limited		Somewhat limited		Very limited	
		Too clayey	0.50	Too clayey	0.50	Sodium content	1.00
						Too clayey	1.00
EsB:							
Eloso	70	Somewhat limited		Somewhat limited		Very limited	
		Too clayey	0.50	Too clayey	0.50	Too clayey	1.00
						Depth to bedrock	0.02
EvC:							
Esseville	75	Somewhat limited		Somewhat limited		Very limited	
		Too clayey	0.50	Too clayey	0.50	Sodium content	1.00
						Too clayey	1.00
						Depth to bedrock	0.14
FaC:							
Fashing	90	Somewhat limited		Somewhat limited		Very limited	
		Too clayey	0.50	Too clayey	0.50	Depth to bedrock	1.00
						Sodium content	1.00
						Too clayey	1.00
						Droughty	0.07
FoB:							
Floresville, eroded	75	Not limited		Not limited		Not limited	
HnC:							
Hindes	85	Very limited		Very limited		Very limited	
		Gravel	1.00	Gravel	1.00	Gravel	1.00
						Droughty	0.74
						Large stones	0.08
HoB:							
Houla	66	Not limited		Not limited		Not limited	

Table 17.--Paths, Trails, and Golf Course Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf course fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
ImB:							
Imogene, occasionally flooded	80	Somewhat limited		Somewhat limited		Very limited	
		Too sandy	0.17	Too sandy	0.17	Sodium content	1.00
						Flooding	0.60
LaB:							
Laparita, rarely flooded	70	Not limited		Not limited		Very limited	
						Sodium content	1.00
LeB:							
Lasalle	80	Somewhat limited		Somewhat limited		Very limited	
		Too clayey	0.50	Too clayey	0.50	Too clayey	1.00
						Sodium content	1.00
						Droughty	0.20
LnB:							
Leoncita	85	Not limited		Not limited		Not limited	
LoC:							
Lomart	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Depth to bedrock	0.92
						Droughty	0.34
MaD:							
Mata	91	Not limited		Not limited		Very limited	
						Sodium content	1.00
						Gravel	0.05
McC:							
Maverick	80	Somewhat limited		Somewhat limited		Very limited	
		Too clayey	0.50	Too clayey	0.50	Sodium content	1.00
						Too clayey	1.00
						Depth to bedrock	0.01
MgD:							
Mirasol	85	Not limited		Not limited		Very limited	
						Depth to cemented pan	1.00
						Droughty	1.00
						Gravel	1.00
MoC:							
Moglia	80	Not limited		Not limited		Very limited	
						Sodium content	1.00
						Droughty	0.54
MtB:							
Montell	80	Somewhat limited		Somewhat limited		Very limited	
		Too clayey	0.50	Too clayey	0.50	Too clayey	1.00
						Sodium content	1.00

Table 17.--Paths, Trails, and Golf Course Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf course fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
MwA:							
Monwebb, occasionally flooded	80	Somewhat limited		Somewhat limited		Very limited	
		Too clayey	0.50	Too clayey	0.50	Too clayey	1.00
						Sodium content	1.00
						Flooding	0.60
OmD:							
Olmedo	90	Not limited		Not limited		Very limited	
						Depth to cemented pan	1.00
						Droughty	1.00
						Carbonate content	1.00
						Gravel	0.99
						Large stones	0.68
PIT:							
Pits	100	Not rated		Not rated		Not rated	
PkC:							
Pavelek, severely eroded	70	Not limited		Not limited		Very limited	
						Depth to cemented pan	1.00
						Droughty	1.00
						Carbonate content	1.00
PrC:							
Pernitas	90	Not limited		Not limited		Not limited	
PtC:							
Pernitas	85	Not limited		Not limited		Not limited	
RNB:							
Rhymes	60	Very limited		Very limited		Somewhat limited	
		Too sandy	1.00	Too sandy	1.00	Droughty	0.39
Nusil	30	Very limited		Very limited		Somewhat limited	
		Too sandy	1.00	Too sandy	1.00	Droughty	0.20
RoB:							
Rosenbrock	70	Somewhat limited		Somewhat limited		Very limited	
		Too clayey	0.50	Too clayey	0.50	Too clayey	1.00
SaB:							
Salco	85	Not limited		Not limited		Very limited	
						Sodium content	1.00
ScD:							
Sancajo	80	Not limited		Not limited		Very limited	
						Depth to cemented pan	1.00
						Droughty	1.00
						Carbonate content	1.00
						Gravel	0.99
						Large stones	0.68

Table 17.--Paths, Trails, and Golf Course Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf course fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SrC:							
Sarnosa	80	Not limited		Not limited		Not limited	
StB:							
Sinton, frequently flooded	75	Somewhat limited		Somewhat limited		Very limited	
		Flooding	0.40	Flooding	0.40	Flooding	1.00
TaB:							
Tela, occasionally flooded	70	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
Tela, frequently flooded	20	Somewhat limited		Somewhat limited		Very limited	
		Flooding	0.40	Flooding	0.40	Flooding	1.00
ToB:							
Tordia	90	Somewhat limited		Somewhat limited		Very limited	
		Too clayey	0.50	Too clayey	0.50	Too clayey	1.00
						Sodium content	1.00
VeC:							
Verick	80	Somewhat limited		Somewhat limited		Very limited	
		Too sandy	0.02	Too sandy	0.02	Depth to bedrock	1.00
						Droughty	1.00
						Sodium content	1.00
VrC:							
Viboras	90	Somewhat limited		Somewhat limited		Very limited	
		Too clayey	0.50	Too clayey	0.50	Too clayey	1.00
						Sodium content	1.00
						Depth to bedrock	0.65
						Droughty	0.59
						Salinity	0.13
W:							
Water	100	Not rated		Not rated		Not rated	
WbB:							
Webb	85	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
WeB:							
Weesatche	85	Somewhat limited		Somewhat limited		Not limited	
		Too sandy	0.40	Too sandy	0.40		
WeC:							
Weesatche	86	Somewhat limited		Somewhat limited		Not limited	
		Too sandy	0.40	Too sandy	0.40		
WgC:							
Weigang	87	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Droughty	0.67

Table 17.--Paths, Trails, and Golf Course Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf course fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
WhC:							
Whitsett------------	60	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.32
						Droughty	0.01
WPD:							
Whitsett------------	60	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.32
						Droughty	0.01
Picosa--------------	30	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Droughty	1.00
ZaB:							
Zavala, frequently flooded------------	60	Somewhat limited		Somewhat limited		Very limited	
		Flooding	0.40	Flooding	0.40	Flooding	1.00
Zavala, occasionally flooded------------	20	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
ZvC:							
Zavco---------------	90	Not limited		Not limited		Not limited	

Table 18.--Dwellings and Small Commercial Buildings

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small Commercial Buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AgB:							
Aguilares	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
AlB:							
Alet, occasionally flooded	55	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
Alet, frequently flooded	20	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
AnC:							
Annarose	75	Not limited		Not limited		Not limited	
ANS:							
Area not surveyed	100	Not rated		Not rated		Not rated	
BeC:							
Benavides	90	Not limited		Not limited		Not limited	
BkB:							
Bookout	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
BnB:							
Brennan	70	Not limited		Not limited		Not limited	
BrB:							
Brundage	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
BsB:							
Brystal	80	Not limited		Not limited		Not limited	
BuA:							
Buchel, occasionally flooded	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
BzA:							
Buchel, frequently flooded	95	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
CaB:							
Caid	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50

Table 18.--Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small Commercial Buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CbB:							
Campbellton	70	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
CcB:							
Catarina	90	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
ChB:							
Chacon	80	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
CkB:							
Choke	70	Somewhat limited		Not limited		Somewhat limited	
		Shrink-swell	0.78			Shrink-swell	0.78
ClA:							
Cochina, occasionally flooded	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
CmA:							
Cochina, frequently flooded	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
CnB:							
Colmena	82	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
CoB:							
Conquista	95	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
CpC:							
Copita	80	Not limited		Somewhat limited		Not limited	
				Depth to soft bedrock	0.08		
CtA:							
Coquat, frequently flooded	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to saturated zone	0.35		
CuB:							
Cotulla	70	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00

Table 18.--Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small Commercial Buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CVB:							
Cotulla	70	Very limited Shrink-swell	 1.00	Very limited Shrink-swell	 1.00	Very limited Shrink-swell	 1.00
Maverick	20	Very limited Shrink-swell	 1.00	Very limited Shrink-swell Depth to soft bedrock	 1.00 0.01	Very limited Shrink-swell	 1.00
CyB:							
Coy	90	Very limited Shrink-swell	 1.00	Very limited Shrink-swell	 1.00	Very limited Shrink-swell	 1.00
CZB:							
Czar	60	Very limited Flooding Shrink-swell	 1.00 0.96	Very limited Flooding Shrink-swell	 1.00 0.96	Very limited Flooding Shrink-swell	 1.00 0.96
Clareville, rarely flooded	30	Very limited Flooding Shrink-swell	 1.00 1.00	Very limited Flooding Shrink-swell	 1.00 1.00	Very limited Flooding Shrink-swell	 1.00 1.00
DAM:							
Dams	100	Not rated		Not rated		Not rated	
DsB:							
Dosrios	80	Very limited Shrink-swell	 1.00	Very limited Shrink-swell	 1.00	Very limited Shrink-swell	 1.00
EsB:							
Eloso	70	Very limited Shrink-swell	 1.00	Very limited Shrink-swell Depth to soft bedrock	 1.00 0.02	Very limited Shrink-swell	 1.00
EvC:							
Esseville	75	Very limited Shrink-swell	 1.00	Very limited Shrink-swell Depth to soft bedrock	 1.00 0.13	Very limited Shrink-swell	 1.00
FaC:							
Fashing	90	Very limited Shrink-swell Depth to soft bedrock	 1.00 0.50	Very limited Shrink-swell Depth to soft bedrock	 1.00 1.00	Very limited Shrink-swell Depth to soft bedrock	 1.00 1.00
FoB:							
Floresville, eroded	75	Somewhat limited Shrink-swell	 0.50	Somewhat limited Shrink-swell	 0.50	Somewhat limited Shrink-swell	 0.50
HnC:							
Hindes	85	Not limited		Not limited		Not limited	
HoB:							
Houla	66	Somewhat limited Shrink-swell	 0.50	Somewhat limited Shrink-swell	 0.50	Somewhat limited Shrink-swell	 0.50

Table 18.--Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small Commercial Buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
ImB:							
Imogene, occasionally flooded	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
LaB:							
Laparita, rarely flooded	70	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
LeB:							
Lasalle	80	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
LnB:							
Leoncita	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
LoC:							
Lomart	80	Not limited		Somewhat limited		Not limited	
				Depth to soft bedrock	0.92		
MaD:							
Mata	91	Not limited		Very limited		Not limited	
				Shrink-swell	1.00		
McC:							
Maverick	80	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to soft bedrock	0.01		
MgD:							
Mirasol	85	Very limited		Very limited		Very limited	
		Depth to thick cemented pan	1.00	Depth to thick cemented pan	1.00	Depth to thick cemented pan	1.00
				Depth to thin cemented pan	1.00	Depth to thin cemented pan	1.00
						Slope	0.12
MoC:							
Moglia	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
MtB:							
Montell	80	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
MwA:							
Monwebb, occasionally flooded	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00

Table 18.--Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small Commercial Buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
OmD:							
Olmedo	90	Very limited		Very limited		Very limited	
		Depth to thick cemented pan	1.00	Depth to thick cemented pan	1.00	Depth to thick cemented pan	1.00
				Depth to thin cemented pan	1.00	Depth to thin cemented pan	1.00
						Slope	0.12
PIT:							
Pits	100	Not rated		Not rated		Not rated	
PkC:							
Pavelek, severely eroded	70	Somewhat limited		Very limited		Somewhat limited	
		Shrink-swell	0.50	Depth to soft bedrock	1.00	Depth to thin cemented pan	1.00
		Depth to soft bedrock	0.50	Depth to thin cemented pan	1.00	Depth to soft bedrock	1.00
				Shrink-swell	0.50	Shrink-swell	0.50
PrC:							
Pernitas	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
PtC:							
Pernitas	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
RNB:							
Rhymes	60	Not limited		Not limited		Not limited	
Nusil	30	Not limited		Somewhat limited		Not limited	
				Shrink-swell	0.50		
RoB:							
Rosenbrock	70	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
SaB:							
Salco	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
ScD:							
Sancajo	80	Somewhat limited		Very limited		Somewhat limited	
		Large stones	0.99	Depth to thin cemented pan	1.00	Depth to thin cemented pan	1.00
				Large stones	0.99	Large stones	0.99
				Depth to soft bedrock	0.01		
SrC:							
Sarnosa	80	Not limited		Not limited		Not limited	
StB:							
Sinton, frequently flooded	75	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00

Table 18.--Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small Commercial Buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
TaB:							
Tela, occasionally flooded	70	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
Tela, frequently flooded	20	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
ToB:							
Tordia	90	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
VeC:							
Verick	80	Somewhat limited		Very limited		Somewhat limited	
		Depth to soft bedrock	0.50	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
VrC:							
Viboras	90	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to soft bedrock	0.64		
W:							
Water	100	Not rated		Not rated		Not rated	
WbB:							
Webb	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.78	Shrink-swell	0.78	Shrink-swell	0.78
WeB:							
Weesatche	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
WeC:							
Weesatche	86	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
WgC:							
Weigang	87	Somewhat limited		Very limited		Somewhat limited	
		Depth to soft bedrock	0.50	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
WhC:							
Whitsett	60	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
				Depth to soft bedrock	0.32		
WPD:							
Whitsett	60	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
				Depth to soft bedrock	0.32		
Picosa	30	Somewhat limited		Very limited		Somewhat limited	
		Depth to soft bedrock	0.50	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
						Slope	0.03

Table 18.--Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small Commercial Buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
ZaB:							
Zavala, frequently flooded------------	60	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
Zavala, occasionally flooded------------	20	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
ZvC:							
Zavco----------------	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50

Table 19.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AgB:							
Aguilares	80	Very limited		Somewhat limited		Very limited	
		Low strength	1.00	Unstable excavation walls	0.10	Sodium content	1.00
		Shrink-swell	0.50			Droughty	0.01
AlB:							
Alet, occasionally flooded	55	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Flooding	0.60	Flooding	0.60
				Unstable excavation walls	0.10		
Alet, frequently flooded	20	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Flooding	0.80	Flooding	1.00
				Unstable excavation walls	0.10		
AnC:							
Annarose	75	Not limited		Somewhat limited		Not limited	
				Unstable excavation walls	0.10		
ANS:							
Area not surveyed	100	Not rated		Not rated		Not rated	
BeC:							
Benavides	90	Not limited		Somewhat limited		Not limited	
				Unstable excavation walls	0.10		
BkB:							
Bookout	85	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Too clayey	0.01		
		Shrink-swell	0.50	Unstable excavation walls	0.10		
BnB:							
Brennan	70	Not limited		Somewhat limited		Not limited	
				Unstable excavation walls	0.10		
BrB:							
Brundage	80	Somewhat limited		Somewhat limited		Very limited	
		Low strength	0.78	Unstable excavation walls	0.10	Sodium content	1.00
		Shrink-swell	0.50			Droughty	0.01
BsB:							
Brystal	80	Not limited		Somewhat limited		Not limited	
				Unstable excavation walls	0.10		

Table 19.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
BuA: Buchel, occasionally flooded	85	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Unstable excavation walls	1.00	Too clayey	1.00
		Flooding	1.00	Too clayey	0.87	Flooding	0.60
		Low strength	1.00	Flooding	0.60		
BzA: Buchel, frequently flooded	95	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Unstable excavation walls	1.00	Flooding	1.00
		Flooding	1.00	Too clayey	0.50	Too clayey	1.00
		Low strength	1.00	Flooding	0.80		
CaB: Caid	80	Somewhat limited		Somewhat limited		Not limited	
		Shrink-swell	0.50	Unstable excavation walls	0.10		
CbB: Campbellton	70	Very limited		Somewhat limited		Very limited	
		Low strength	1.00	Too clayey	0.52	Sodium content	1.00
		Shrink-swell	0.50	Unstable excavation walls	0.10		
CcB: Catarina	90	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Unstable excavation walls	1.00	Sodium content	1.00
		Low strength	1.00	Too clayey	0.50	Too clayey	1.00
						Droughty	0.56
ChB: Chacon	80	Very limited		Somewhat limited		Very limited	
		Shrink-swell	1.00	Too clayey	0.03	Sodium content	1.00
		Low strength	1.00	Unstable excavation walls	0.10		
CkB: Choke	70	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.78				
ClA: Cochina, occasionally flooded	90	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Unstable excavation walls	1.00	Too clayey	1.00
		Flooding	1.00	Too clayey	1.00	Sodium content	1.00
		Low strength	1.00	Flooding	0.60	Flooding	0.60

Table 19.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CmA:							
Cochina, frequently flooded	90	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Unstable excavation walls	1.00	Flooding	1.00
		Flooding	1.00	Too clayey	1.00	Too clayey	1.00
		Low strength	1.00	Flooding	0.80	Sodium content	1.00
CnB:							
Colmena	82	Somewhat limited		Somewhat limited		Not limited	
		Shrink-swell	0.50	Unstable excavation walls	0.10		
CoB:							
Conquista	95	Very limited		Somewhat limited		Very limited	
		Shrink-swell	1.00	Too clayey	0.88	Too clayey	1.00
		Low strength	1.00	Unstable excavation walls	0.10		
CpC:							
Copita	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Low strength	0.78	Unstable excavation walls	0.10	Depth to bedrock	0.08
				Depth to soft bedrock	0.08	Droughty	0.06
CtA:							
Coquat, frequently flooded	85	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Unstable excavation walls	1.00	Flooding	1.00
		Flooding	1.00	Too clayey	0.72	Too clayey	1.00
		Low strength	1.00	Flooding	0.80	Sodium content	1.00
				Depth to saturated zone	0.35		
CuB:							
Cotulla	70	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Unstable excavation walls	1.00	Sodium content	1.00
		Low strength	1.00	Too clayey	0.50	Droughty	0.03
CVB:							
Cotulla	70	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Unstable excavation walls	1.00	Sodium content	1.00
		Low strength	1.00	Too clayey	0.50	Droughty	0.03
Maverick	20	Very limited		Somewhat limited		Very limited	
		Shrink-swell	1.00	Too clayey	0.50	Sodium content	1.00
		Low strength	1.00	Unstable excavation walls	0.10	Too clayey	1.00
				Depth to soft bedrock	0.01	Depth to bedrock	0.01
CyB:							
Coy	90	Very limited		Somewhat limited		Not limited	
		Shrink-swell	1.00	Too clayey	0.28		
		Low strength	1.00	Unstable excavation walls	0.10		

Table 19.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CZB:							
Czar	60	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.96				
		Flooding	0.40				
Clareville, rarely flooded	30	Very limited		Somewhat limited		Very limited	
		Shrink-swell	1.00	Unstable excavation walls	0.10	Sodium content	1.00
		Low strength	1.00				
		Flooding	0.40				
DAM:							
Dams	100	Not rated		Not rated		Not rated	
DsB:							
Dosrios	80	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Unstable excavation walls	1.00	Sodium content	1.00
		Low strength	1.00	Too clayey	0.68	Too clayey	1.00
EsB:							
Eloso	70	Very limited		Somewhat limited		Very limited	
		Shrink-swell	1.00	Too clayey	0.88	Too clayey	1.00
		Low strength	1.00	Unstable excavation walls	0.10	Depth to bedrock	0.02
				Depth to soft bedrock	0.02		
EvC:							
Esseville	75	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Unstable excavation walls	1.00	Sodium content	1.00
		Low strength	1.00	Too clayey	0.99	Too clayey	1.00
				Depth to soft bedrock	0.13	Depth to bedrock	0.14
FaC:							
Fashing	90	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
		Depth to soft bedrock	1.00	Too clayey	0.99	Sodium content	1.00
		Low strength	1.00	Dense layer	0.50	Too clayey	1.00
				Unstable excavation walls	0.10	Droughty	0.07
FoB:							
Floresville, eroded	75	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Too clayey	0.03		
		Shrink-swell	0.50	Unstable excavation walls	0.10		
HnC:							
Hindes	85	Not limited		Very limited		Very limited	
				Unstable excavation walls	1.00	Gravel	1.00
						Droughty	0.74
						Large stones	0.08

Table 19.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
HoB: Houla	66	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				
ImB: Imogene, occasionally flooded	80	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Flooding	0.60	Sodium content	1.00
		Low strength	0.78	Unstable excavation walls	0.10	Flooding	0.60
		Shrink-swell	0.50				
LaB: Laparita, rarely flooded	70	Very limited		Somewhat limited		Very limited	
		Shrink-swell	1.00	Too clayey	0.50	Sodium content	1.00
		Low strength	1.00	Unstable excavation walls	0.10		
		Flooding	0.40				
LeB: Lasalle	80	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Unstable excavation walls	1.00	Too clayey	1.00
		Low strength	1.00	Too clayey	0.50	Sodium content	1.00
						Droughty	0.20
LnB: Leoncita	85	Somewhat limited		Somewhat limited		Not limited	
		Shrink-swell	0.50	Unstable excavation walls	0.10		
		Low strength	0.22				
LoC: Lomart	80	Not limited		Somewhat limited		Somewhat limited	
				Depth to soft bedrock	0.92	Depth to bedrock	0.92
				Unstable excavation walls	0.10	Droughty	0.34
MaD: Mata	91	Not limited		Very limited		Very limited	
				Unstable excavation walls	1.00	Sodium content	1.00
				Too clayey	0.50	Gravel	0.05
McC: Maverick	80	Very limited		Somewhat limited		Very limited	
		Shrink-swell	1.00	Too clayey	0.50	Sodium content	1.00
		Low strength	1.00	Unstable excavation walls	0.10	Too clayey	1.00
				Depth to soft bedrock	0.01	Depth to bedrock	0.01

Table 19.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
MgD:							
Mirasol	85	Very limited		Very limited		Very limited	
		Depth to thick cemented pan	1.00	Depth to thick cemented pan	1.00	Depth to cemented pan	1.00
		Depth to thin cemented pan	1.00	Depth to thin cemented pan	1.00	Droughty	1.00
				Unstable excavation walls	0.50	Gravel	1.00
MoC:							
Moglia	80	Very limited		Somewhat limited		Very limited	
		Low strength	1.00	Unstable excavation walls	0.10	Sodium content	1.00
		Shrink-swell	0.50			Droughty	0.54
MtB:							
Montell	80	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Unstable excavation walls	1.00	Too clayey	1.00
		Low strength	1.00	Too clayey	0.50	Sodium content	1.00
MwA:							
Monwebb, occasionally flooded	80	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Unstable excavation walls	1.00	Too clayey	1.00
		Flooding	1.00	Too clayey	0.50	Sodium content	1.00
		Low strength	1.00	Flooding	0.60	Flooding	0.60
OmD:							
Olmedo	90	Very limited		Very limited		Very limited	
		Depth to thick cemented pan	1.00	Depth to thick cemented pan	1.00	Depth to cemented pan	1.00
		Depth to thin cemented pan	1.00	Depth to thin cemented pan	1.00	Droughty	1.00
				Unstable excavation walls	1.00	Carbonate content	1.00
						Gravel	0.99
						Large stones	0.68
PIT:							
Pits	100	Not rated		Not rated		Not rated	
PkC:							
Pavelek, severely eroded	70	Very limited		Very limited		Very limited	
		Depth to thin cemented pan	1.00	Depth to soft bedrock	1.00	Depth to cemented pan	1.00
		Depth to soft bedrock	1.00	Depth to thin cemented pan	1.00	Droughty	1.00
		Low strength	1.00	Unstable excavation walls	0.50	Carbonate content	1.00
		Shrink-swell	0.50				

Table 19.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
PrC:							
Pernitas------------	90	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				
PtC:							
Pernitas------------	85	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				
RNB:							
Rhymes--------------	60	Not limited		Very limited		Somewhat limited	
				Unstable excavation walls	1.00	Droughty	0.39
Nusil---------------	30	Not limited		Very limited		Somewhat limited	
				Unstable excavation walls	1.00	Droughty	0.20
RoB:							
Rosenbrock----------	70	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Unstable excavation walls	1.00	Too clayey	1.00
		Low strength	1.00	Too clayey	0.72		
SaB:							
Salco---------------	85	Somewhat limited		Somewhat limited		Very limited	
		Shrink-swell	0.50	Unstable excavation walls	0.10	Sodium content	1.00
		Low strength	0.22				
ScD:							
Sancajo-------------	80	Somewhat limited		Very limited		Very limited	
		Depth to thin cemented pan	1.00	Depth to thin cemented pan	1.00	Depth to cemented pan	1.00
		Large stones	0.99	Large stones	0.99	Droughty	1.00
				Unstable excavation walls	0.50	Carbonate content	1.00
				Depth to soft bedrock	0.01	Gravel	0.99
						Large stones	0.68
SrC:							
Sarnosa-------------	80	Not limited		Somewhat limited		Not limited	
				Unstable excavation walls	0.10		
StB:							
Sinton, frequently flooded------------	75	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Flooding	0.80	Flooding	1.00
				Unstable excavation walls	0.10		

Table 19.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
TaB:							
Tela, occasionally flooded	70	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Flooding	0.60	Flooding	0.60
				Unstable excavation walls	0.10		
Tela, frequently flooded	20	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Flooding	0.80	Flooding	1.00
				Unstable excavation walls	0.10		
ToB:							
Tordia	90	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Unstable excavation walls	1.00	Too clayey	1.00
		Low strength	1.00	Too clayey	0.50	Sodium content	1.00
VeC:							
Verick	80	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
				Unstable excavation walls	0.50	Droughty	1.00
						Sodium content	1.00
VrC:							
Viboras	90	Very limited		Somewhat limited		Very limited	
		Shrink-swell	1.00	Too clayey	0.50	Too clayey	1.00
		Low strength	1.00	Depth to soft bedrock	0.64	Sodium content	1.00
				Unstable excavation walls	0.10	Depth to bedrock	0.65
						Droughty	0.59
						Salinity	0.13
W:							
Water	100	Not rated		Not rated		Not rated	
WbB:							
Webb	85	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.78				
WeB:							
Weesatche	85	Somewhat limited		Somewhat limited		Not limited	
		Shrink-swell	0.50	Unstable excavation walls	0.10		
WeC:							
Weesatche	86	Somewhat limited		Somewhat limited		Not limited	
		Shrink-swell	0.50	Unstable excavation walls	0.10		

Table 19.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
WgC:							
Weigang	87	Very limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
		Low strength	1.00	Unstable excavation walls	0.10	Droughty	0.67
WhC:							
Whitsett	60	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Depth to soft bedrock	0.32	Depth to bedrock	0.32
		Shrink-swell	0.50	Unstable excavation walls	0.10	Droughty	0.01
WPD:							
Whitsett	60	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Depth to soft bedrock	0.32	Depth to bedrock	0.32
		Shrink-swell	0.50	Unstable excavation walls	0.10	Droughty	0.01
Picosa	30	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
		Low strength	0.78	Unstable excavation walls	0.10	Droughty	1.00
ZaB:							
Zavala, frequently flooded	60	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Flooding	0.80	Flooding	1.00
				Unstable excavation walls	0.10		
Zavala, occasionally flooded	20	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Flooding	0.60	Flooding	0.60
				Unstable excavation walls	0.10		
ZvC:							
Zavco	90	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				

Table 20.--Sewage Disposal

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Septic Tank Absorption Fields		Sewage Lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
AgB:					
Aguilares	80	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
AlB:					
Alet, occasionally flooded	55	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Slow water movement	0.68	Seepage	0.68
Alet, frequently flooded	20	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Slow water movement	0.68	Seepage	0.68
AnC:					
Annarose	75	Somewhat limited		Somewhat limited	
		Moderate depth to bedrock	0.88	Seepage	0.50
		Slow water movement	0.50	Depth to soft bedrock	0.68
				Slope	0.08
ANS:					
Area not surveyed	100	Not rated		Not rated	
BeC:					
Benavides	90	Somewhat limited		Somewhat limited	
		Slow water movement	0.68	Seepage	0.32
				Slope	0.18
BkB:					
Bookout	85	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
BnB:					
Brennan	70	Very limited		Somewhat limited	
		Slow water movement	1.00	Seepage	0.08
BrB:					
Brundage	80	Very limited		Not limited	
		Slow water movement	1.00		
BsB:					
Brystal	80	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
BuA:					
Buchel, occasionally flooded	85	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Slow water movement	1.00		

Table 20.--Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic Tank Absorption Fields		Sewage Lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
BzA:					
Buchel, frequently flooded	95	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Slow water movement	1.00		
CaB:					
Caid	80	Somewhat limited		Very limited	
		Slow water movement	0.50	Seepage	1.00
CbB:					
Campbellton	70	Very limited		Somewhat limited	
		Slow water movement	1.00	Seepage	0.50
		Bedrock lower in the soil	0.12		
CcB:					
Catarina	90	Very limited		Not limited	
		Slow water movement	1.00		
ChB:					
Chacon	80	Very limited		Not limited	
		Slow water movement	1.00		
CkB:					
Choke	70	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
ClA:					
Cochina, occasionally flooded	90	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Slow water movement	1.00		
CmA:					
Cochina, frequently flooded	90	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Slow water movement	1.00		
CnB:					
Colmena	82	Somewhat limited		Very limited	
		Slow water movement	0.50	Seepage	1.00
CoB:					
Conquista	95	Very limited		Not limited	
		Slow water movement	1.00		
CpC:					
Copita	80	Very limited		Very limited	
		Shallow depth to bedrock	1.00	Depth to soft bedrock	1.00
				Seepage	1.00
				Slope	0.02

Table 20.--Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic Tank Absorption Fields		Sewage Lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
CtA:					
Coquat, frequently flooded	85	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Slow water movement	1.00	Depth to saturated zone	0.17
		Depth to saturated zone	0.84		
CuB:					
Cotulla	70	Very limited		Not limited	
		Slow water movement	1.00		
CVB:					
Cotulla	70	Very limited		Not limited	
		Slow water movement	1.00		
Maverick	20	Very limited		Very limited	
		Slow water movement	1.00	Depth to soft bedrock	1.00
		Shallow depth to bedrock	1.00		
CyB:					
Coy	90	Very limited		Not limited	
		Slow water movement	1.00		
CZB:					
Czar	60	Somewhat limited		Very limited	
		Flooding	0.40	Seepage	1.00
				Flooding	0.40
Clareville, rarely flooded	30	Very limited		Somewhat limited	
		Slow water movement	1.00	Flooding	0.40
		Flooding	0.40		
DAM:					
Dams	100	Not rated		Not rated	
DsB:					
Dosrios	80	Very limited		Not limited	
		Slow water movement	1.00		
EsB:					
Eloso	70	Very limited		Very limited	
		Shallow depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slow water movement	1.00		
EvC:					
Esseville	75	Very limited		Very limited	
		Shallow depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slow water movement	1.00	Slope	0.02

Table 20.--Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic Tank Absorption Fields		Sewage Lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
FaC:					
Fashing	90	Very limited		Very limited	
		Shallow depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slow water movement	1.00	Slope	0.02
FoB:					
Floresville, eroded	75	Very limited		Not limited	
		Slow water movement	1.00		
HnC:					
Hindes	85	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
				Slope	0.18
HoB:					
Houla	66	Not limited		Very limited	
				Seepage	1.00
ImB:					
Imogene, occasionally flooded	80	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Slow water movement	1.00		
LaB:					
Laparita, rarely flooded	70	Very limited		Somewhat limited	
		Slow water movement	1.00	Flooding	0.40
		Flooding	0.40		
LeB:					
Lasalle	80	Very limited		Not limited	
		Slow water movement	1.00		
LnB:					
Leoncita	85	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
LoC:					
Lomart	80	Very limited		Very limited	
		Shallow depth to bedrock	1.00	Depth to soft bedrock	1.00
				Seepage	1.00
				Slope	0.02
MaD:					
Mata	91	Very limited		Somewhat limited	
		Slow water movement	1.00	Seepage	0.50
				Slope	0.02
				Depth to soft bedrock	0.92

Table 20.--Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic Tank Absorption Fields		Sewage Lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
McC:					
Maverick	80	Very limited		Very limited	
		Slow water movement	1.00	Depth to soft bedrock	1.00
		Shallow depth to bedrock	1.00	Slope	0.08
MgD:					
Mirasol	85	Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00
				Slope	0.68
				Seepage	0.50
MoC:					
Moglia	80	Very limited		Somewhat limited	
		Slow water movement	1.00	Seepage	0.50
MtB:					
Montell	80	Very limited		Not limited	
		Slow water movement	1.00		
MwA:					
Monwebb, occasionally flooded	80	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Slow water movement	1.00		
OmD:					
Olmedo	90	Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00
				Slope	0.68
PIT:					
Pits	100	Not rated		Not rated	
PkC:					
Pavelek, severely eroded	70	Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to soft bedrock	1.00
				Depth to cemented pan	1.00
				Seepage	0.50
				Slope	0.32
PrC:					
Pernitas	90	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
PtC:					
Pernitas	85	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
				Slope	0.08

Table 20.--Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic Tank Absorption Fields		Sewage Lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
RNB:					
Rhymes	60	Very limited		Very limited	
		Slow water movement	1.00	Seepage	1.00
Nusil	30	Very limited		Very limited	
		Slow water movement	1.00	Seepage	1.00
RoB:					
Rosenbrock	70	Very limited		Not limited	
		Slow water movement	1.00		
SaB:					
Salco	85	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
ScD:					
Sancajo	80	Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to soft bedrock	1.00
		Large stones	0.99	Depth to cemented pan	1.00
				Large stones	1.00
				Seepage	0.50
				Slope	0.02
SrC:					
Sarnosa	80	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Slow water movement	0.50	Slope	0.18
StB:					
Sinton, frequently flooded	75	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Slow water movement	0.92	Seepage	0.08
TaB:					
Tela, occasionally flooded	70	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Slow water movement	0.50	Seepage	0.50
Tela, frequently flooded	20	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Slow water movement	0.50	Seepage	0.50
ToB:					
Tordia	90	Very limited		Somewhat limited	
		Slow water movement	1.00	Depth to soft bedrock	0.18
		Moderate depth to bedrock	0.62	Slope	0.02

Table 20.--Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic Tank Absorption Fields		Sewage Lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
VeC:					
Verick	80	Very limited		Very limited	
		Shallow depth to bedrock	1.00	Depth to soft bedrock	1.00
				Slope	0.18
VrC:					
Viboras	90	Very limited		Very limited	
		Shallow depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slow water movement	1.00	Slope	0.08
W:					
Water	100	Not rated		Not rated	
WbB:					
Webb	85	Very limited		Somewhat limited	
		Slow water movement	1.00	Seepage	0.50
WeB:					
Weesatche	85	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
WeC:					
Weesatche	86	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
				Slope	0.32
WgC:					
Weigang	87	Very limited		Very limited	
		Shallow depth to bedrock	1.00	Depth to soft bedrock	1.00
				Slope	0.02
WhC:					
Whitsett	60	Very limited		Very limited	
		Shallow depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slow water movement	1.00	Seepage	0.50
				Slope	0.08
WPD:					
Whitsett	60	Very limited		Very limited	
		Shallow depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slow water movement	1.00	Seepage	0.50
Picosa	30	Very limited		Very limited	
		Shallow depth to bedrock	1.00	Depth to soft bedrock	1.00
				Slope	0.50
				Seepage	0.27

Table 20.--Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic Tank Absorption Fields		Sewage Lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
ZaB:					
Zavala, frequently flooded	60	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
Zavala, occasionally flooded	20	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
ZvC:					
Zavco	90	Very limited		Somewhat limited	
		Slow water movement	1.00	Seepage	0.50
				Slope	0.02

Table 21.--Landfills

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AgB:							
Aguilares	80	Not limited		Not limited		Not limited	
AlB:							
Alet, occasionally flooded	55	Very limited		Very limited		Not limited	
		Flooding	1.00	Flooding	1.00		
Alet, frequently flooded	20	Very limited		Very limited		Not limited	
		Flooding	1.00	Flooding	1.00		
AnC:							
Annarose	75	Very limited		Not limited		Somewhat limited	
		Depth to bedrock	1.00			Depth to bedrock	0.68
ANS:							
Area not surveyed	100	Not rated		Not rated		Not rated	
BeC:							
Benavides	90	Not limited		Not limited		Not limited	
BkB:							
Bookout	85	Not limited		Not limited		Not limited	
BnB:							
Brennan	70	Not limited		Not limited		Not limited	
BrB:							
Brundage	80	Not limited		Not limited		Not limited	
BsB:							
Brystal	80	Not limited		Not limited		Not limited	
BuA:							
Buchel, occasionally flooded	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Too clayey	1.00
		Too clayey	1.00			Hard to compact	1.00
BzA:							
Buchel, frequently flooded	95	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Too clayey	1.00
		Too clayey	1.00			Hard to compact	1.00
CaB:							
Caid	80	Not limited		Not limited		Not limited	

Table 21.—Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CbB:							
Campbellton	70	Very limited		Not limited		Very limited	
		Depth to bedrock	1.00			Sodium content	1.00
		Excess sodium	1.00			Too clayey	0.50
		Too clayey	0.50				
CcB:							
Catarina	90	Very limited		Not limited		Very limited	
		Too clayey	1.00			Too clayey	1.00
		Excess sodium	1.00			Hard to compact	1.00
						Sodium content	1.00
ChB:							
Chacon	80	Very limited		Not limited		Very limited	
		Too clayey	1.00			Too clayey	1.00
		Excess sodium	1.00			Hard to compact	1.00
						Sodium content	1.00
CkB:							
Choke	70	Not limited		Not limited		Not limited	
ClA:							
Cochina, occasionally flooded	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Too clayey	1.00
		Too clayey	1.00			Hard to compact	1.00
		Excess sodium	1.00			Sodium content	1.00
CmA:							
Cochina, frequently flooded	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Too clayey	1.00
		Too clayey	1.00			Hard to compact	1.00
		Excess sodium	1.00			Sodium content	1.00
CnB:							
Colmena	82	Not limited		Not limited		Not limited	
CoB:							
Conquista	95	Very limited		Not limited		Very limited	
		Too clayey	1.00			Too clayey	1.00
						Hard to compact	1.00
CpC:							
Copita	80	Very limited		Not limited		Very limited	
		Depth to bedrock	1.00			Depth to bedrock	1.00
CtA:							
Coquat, frequently flooded	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Too clayey	1.00
		Too clayey	1.00	Depth to saturated zone	1.00	Hard to compact	1.00
		Depth to saturated zone	1.00			Sodium content	1.00
		Excess sodium	1.00				

Table 21.--Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CuB:							
Cotulla-------------	70	Very limited		Not limited		Very limited	
		Too clayey	1.00			Too clayey	1.00
		Excess sodium	1.00			Hard to compact	1.00
						Sodium content	1.00
CVB:							
Cotulla-------------	70	Very limited		Not limited		Very limited	
		Too clayey	1.00			Too clayey	1.00
		Excess sodium	1.00			Hard to compact	1.00
						Sodium content	1.00
Maverick------------	20	Very limited		Not limited		Very limited	
		Depth to bedrock	1.00			Hard to compact	1.00
						Depth to bedrock	1.00
CyB:							
Coy-----------------	90	Very limited		Not limited		Very limited	
		Too clayey	1.00			Too clayey	1.00
						Hard to compact	1.00
CZB:							
Czar----------------	60	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.50	Flooding	0.40	Too clayey	0.50
		Flooding	0.40				
Clareville, rarely flooded------------	30	Very limited		Somewhat limited		Very limited	
		Excess sodium	1.00	Flooding	0.40	Sodium content	1.00
		Flooding	0.40			Too clayey	0.50
DAM:							
Dams----------------	100	Not rated		Not rated		Not rated	
DsB:							
Dosrios-------------	80	Very limited		Not limited		Very limited	
		Too clayey	1.00			Sodium content	1.00
		Excess sodium	1.00			Too clayey	1.00
						Hard to compact	1.00
EsB:							
Eloso---------------	70	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Too clayey	1.00			Too clayey	1.00
						Hard to compact	1.00
EvC:							
Esseville-----------	75	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Too clayey	1.00			Too clayey	1.00
		Excess sodium	1.00			Hard to compact	1.00
						Sodium content	1.00

Table 21.--Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
FaC:							
Fashing	90	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Too clayey	1.00			Too clayey	1.00
		Excess sodium	1.00			Hard to compact	1.00
						Sodium content	1.00
FoB:							
Floresville, eroded	75	Not limited		Not limited		Not limited	
HnC:							
Hindes	85	Not limited		Not limited		Somewhat limited	
						Gravel content	0.22
HoB:							
Houla	66	Not limited		Not limited		Somewhat limited	
						Seepage	0.50
ImB:							
Imogene, occasionally flooded	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Sodium content	1.00
		Excess sodium	1.00				
LaB:							
Laparita, rarely flooded	70	Very limited		Somewhat limited		Very limited	
		Excess sodium	1.00	Flooding	0.40	Sodium content	1.00
		Too clayey	0.50			Too clayey	0.50
		Flooding	0.40				
LeB:							
Lasalle	80	Very limited		Not limited		Very limited	
		Too clayey	1.00			Too clayey	1.00
		Excess sodium	1.00			Hard to compact	1.00
						Sodium content	1.00
LnB:							
Leoncita	85	Not limited		Not limited		Not limited	
LoC:							
Lomart	80	Very limited		Not limited		Very limited	
		Depth to bedrock	1.00			Depth to bedrock	1.00
						Seepage	0.50
MaD:							
Mata	91	Not limited		Not limited		Very limited	
						Hard to compact	1.00
						Gravel content	0.09
McC:							
Maverick	80	Very limited		Not limited		Very limited	
		Depth to bedrock	1.00			Hard to compact	1.00
						Depth to bedrock	1.00

Table 21.--Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
MgD: Mirasol	85	Very limited		Very limited		Very limited	
		Depth to thick cemented pan	1.00	Depth to cemented pan	1.00	Depth to cemented pan	1.00
						Gravel content	1.00
MoC: Moglia	80	Not limited		Not limited		Not limited	
MtB: Montell	80	Very limited		Not limited		Very limited	
		Too clayey	1.00			Too clayey	1.00
		Excess sodium	1.00			Hard to compact	1.00
						Sodium content	1.00
MwA: Monwebb, occasionally flooded	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Too clayey	1.00
		Too clayey	1.00			Hard to compact	1.00
		Excess sodium	1.00			Sodium content	1.00
OmD: Olmedo	90	Very limited		Very limited		Very limited	
		Depth to thick cemented pan	1.00	Depth to cemented pan	1.00	Depth to cemented pan	1.00
						Gravel content	1.00
PIT: Pits	100	Not rated		Very limited		Not rated	
				Seepage	1.00		
PkC: Pavelek, severely eroded	70	Very limited		Very limited		Very limited	
		Too clayey	1.00	Depth to cemented pan	1.00	Depth to cemented pan	1.00
		Depth to thin cemented pan	0.50			Too clayey	1.00
						Hard to compact	1.00
PrC: Pernitas	90	Not limited		Not limited		Not limited	
PtC: Pernitas	85	Not limited		Not limited		Not limited	
RNB: Rhymes	60	Somewhat limited		Very limited		Somewhat limited	
		Too sandy	0.50	Seepage	1.00	Too sandy	0.50
Nusil	30	Not limited		Very limited		Not limited	
				Seepage	1.00		
RoB: Rosenbrock	70	Very limited		Not limited		Very limited	
		Too clayey	1.00			Too clayey	1.00
						Hard to compact	1.00

Table 21.--Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SaB:							
Salco	85	Not limited		Not limited		Not limited	
ScD:							
Sancajo	80	Somewhat limited		Very limited		Very limited	
		Large stones	0.99	Depth to cemented pan	1.00	Depth to cemented pan	1.00
		Depth to thin cemented pan	0.50			Carbonate content	1.00
						Large stones	0.99
						Gravel content	0.13
SrC:							
Sarnosa	80	Very limited		Not limited		Somewhat limited	
		Seepage, bottom layer	1.00			Seepage	0.50
StB:							
Sinton, frequently flooded	75	Very limited		Very limited		Not limited	
		Flooding	1.00	Flooding	1.00		
TaB:							
Tela, occasionally flooded	70	Very limited		Very limited		Not limited	
		Flooding	1.00	Flooding	1.00		
Tela, frequently flooded	20	Very limited		Very limited		Not limited	
		Flooding	1.00	Flooding	1.00		
ToB:							
Tordia	90	Very limited		Somewhat limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	0.18	Too clayey	1.00
		Too clayey	1.00			Hard to compact	1.00
						Depth to bedrock	0.18
VeC:							
Verick	80	Very limited		Not limited		Very limited	
		Depth to bedrock	1.00			Depth to bedrock	1.00
						Seepage	0.21
VrC:							
Viboras	90	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Too clayey	1.00			Too clayey	1.00
		Excess sodium	1.00			Hard to compact	1.00
		Excess salt	1.00			Salinity	1.00
						Sodium content	1.00
W:							
Water	100	Not rated		Not rated		Not rated	
WbB:							
Webb	85	Not limited		Not limited		Not limited	

Table 21.--Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
WeB:							
Weesatche	85	Not limited		Not limited		Not limited	
WeC:							
Weesatche	86	Not limited		Not limited		Not limited	
WgC:							
Weigang	87	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
WhC:							
Whitsett	60	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Too clayey	0.50			Too clayey	0.50
WPD:							
Whitsett	60	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
Picosa	30	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
ZaB:							
Zavala, frequently flooded	60	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Flooding	1.00	Seepage	0.50
		Seepage, bottom layer	1.00	Seepage	1.00		
Zavala, occasionally flooded	20	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Flooding	1.00	Seepage	0.50
		Seepage, bottom layer	1.00	Seepage	1.00		
ZvC:							
Zavco	90	Not limited		Not limited		Not limited	

Table 22.--Source of Gravel and Sand

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The ratings given for the thickest layer are for the thickest layer above and excluding the bottom layer. The numbers in the value columns range from 0.00 to 0.99. The greater the value, the greater the likelihood that the bottom layer or thickest layer of the soil is a source of sand or gravel. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Gravel Source		Sand Source	
		Rating class and limiting features	Value	Rating class and limiting features	Value
AgB:					
Aguilares-----------	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
AlB:					
Alet, occasionally flooded------------	55	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.01
		Thickest layer	0.00	Thickest layer	0.01
Alet, frequently flooded------------	20	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.01
		Thickest layer	0.00	Thickest layer	0.01
AnC:					
Annarose------------	75	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.07
		Thickest layer	0.00	Thickest layer	0.07
ANS:					
Area not surveyed---	100	Not rated		Not rated	
BeC:					
Benavides-----------	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
BkB:					
Bookout-------------	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
BnB:					
Brennan-------------	70	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
BrB:					
Brundage------------	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
BsB:					
Brystal-------------	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Table 22.--Source of Gravel and Sand--Continued

Map symbol and soil name	Pct. of map unit	Gravel Source		Sand Source	
		Rating class and limiting features	Value	Rating class and limiting features	Value
BuA:					
Buchel, occasionally flooded	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
BzA:					
Buchel, frequently flooded	95	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
CaB:					
Caid	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
CbB:					
Campbellton	70	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
CcB:					
Catarina	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
ChB:					
Chacon	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
CkB:					
Choke	70	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
ClA:					
Cochina, occasionally flooded	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
CmA:					
Cochina, frequently flooded	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
CnB:					
Colmena	82	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Table 22.--Source of Gravel and Sand--Continued

Map symbol and soil name	Pct. of map unit	Gravel Source		Sand Source	
		Rating class and limiting features	Value	Rating class and limiting features	Value
CoB:					
Conquista	95	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
CpC:					
Copita	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
CtA:					
Coquat, frequently flooded	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
CuB:					
Cotulla	70	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
CVB:					
Cotulla	70	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Maverick	20	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
CyB:					
Coy	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
CZB:					
Czar	60	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Clareville, rarely flooded	30	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
DAM:					
Dams	100	Not rated		Not rated	
DsB:					
Dosrios	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
EsB:					
Eloso	70	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Table 22.--Source of Gravel and Sand--Continued

Map symbol and soil name	Pct. of map unit	Gravel Source		Sand Source	
		Rating class and limiting features	Value	Rating class and limiting features	Value
EvC:					
Esseville	75	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
FaC:					
Fashing	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
FoB:					
Floresville, eroded	75	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
HnC:					
Hindes	85	Fair		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.12	Thickest layer	0.00
HoB:					
Houla	66	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
ImB:					
Imogene, occasionally flooded	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
LaB:					
Laparita, rarely flooded	70	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
LeB:					
Lasalle	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
LnB:					
Leoncita	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
LoC:					
Lomart	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
MaD:					
Mata	91	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Table 22.--Source of Gravel and Sand--Continued

Map symbol and soil name	Pct. of map unit	Gravel Source		Sand Source	
		Rating class and limiting features	Value	Rating class and limiting features	Value
McC:					
Maverick	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
MgD:					
Mirasol	85	Poor		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
MoC:					
Moglia	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
MtB:					
Montell	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
MwA:					
Monwebb, occasionally flooded	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
OmD:					
Olmedo	90	Fair		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.57	Thickest layer	0.00
PIT:					
Pits	100	Not rated		Not rated	
PkC:					
Pavelek, severely eroded	70	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
PrC:					
Pernitas	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
PtC:					
Pernitas	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
RNB:					
Rhymes	60	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.10
Nusil	30	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Table 22.--Source of Gravel and Sand--Continued

Map symbol and soil name	Pct. of map unit	Gravel Source		Sand Source	
		Rating class and limiting features	Value	Rating class and limiting features	Value
RoB:					
Rosenbrock	70	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
SaB:					
Salco	85	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.01
ScD:					
Sancajo	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
SrC:					
Sarnosa	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
StB:					
Sinton, frequently flooded	75	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
TaB:					
Tela, occasionally flooded	70	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Tela, frequently flooded	20	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
ToB:					
Tordia	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
VeC:					
Verick	80	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.03
VrC:					
Viboras	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
W:					
Water	100	Not rated		Not rated	

Table 22.--Source of Gravel and Sand--Continued

Map symbol and soil name	Pct. of map unit	Gravel Source		Sand Source	
		Rating class and limiting features	Value	Rating class and limiting features	Value
WbB:					
Webb	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
WeB:					
Weesatche	85	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.04
WeC:					
Weesatche	86	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.05
WgC:					
Weigang	87	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
WhC:					
Whitsett	60	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
WPD:					
Whitsett	60	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Picosa	30	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
ZaB:					
Zavala, frequently flooded	60	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Zavala, occasionally flooded	20	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
ZvC:					
Zavco	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Table 23.--Source of Reclamation Material, Roadfill, and Topsoil

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The ratings given for the thickest layer are for the thickest layer above and excluding the bottom layer. The numbers in the value columns range from 0.00 to 0.99. The greater the value, the greater the likelihood that the bottom layer or thickest layer of the soil is a source of sand or gravel. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Reclamation Source		Roadfill Source		Topsoil Source	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AgB:							
Aguilares	80	Poor		Fair		Poor	
		Sodium content	0.00	Low strength	0.78	Sodium content	0.00
		Salinity	0.50	Shrink-swell	0.87	Salinity	0.00
		Organic matter content low	0.60			Carbonate content	0.86
AlB:							
Alet, occasionally flooded	55	Good		Good		Good	
Alet, frequently flooded	20	Good		Good		Good	
AnC:							
Annarose	75	Fair		Fair		Fair	
		Organic matter content low	0.12	Depth to bedrock	0.32	Carbonate content	0.73
		Carbonate content	0.46			Too sandy	0.92
		Too sandy	0.92				
ANS:							
Area not surveyed	100	Not rated		Not rated		Not rated	
BeC:							
Benavides	90	Fair		Good		Good	
		Carbonate content	0.32				
BkB:							
Bookout	85	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Carbonate content	0.32	Shrink-swell	0.87		
BnB:							
Brennan	70	Fair		Good		Good	
		Organic matter content low	0.40				
BrB:							
Brundage	80	Poor		Fair		Poor	
		Sodium content	0.00	Low strength	0.22	Salinity	0.00
		Water erosion	0.99	Shrink-swell	0.87	Sodium content	0.00
		Salinity	0.50				
BsB:							
Brystal	80	Fair		Good		Fair	
		Organic matter content low	0.12			Sodium content	0.78
		Sodium content	0.78				

Table 23.--Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Reclamation Source		Roadfill Source		Topsoil Source	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
BuA:							
Buchel, occasionally flooded	85	Poor		Poor		Poor	
		Too clayey	0.00	Shrink-swell	0.00	Too clayey	0.00
		Carbonate content	0.68	Low strength	0.00		
BzA:							
Buchel, frequently flooded	95	Poor		Poor		Poor	
		Too clayey	0.00	Shrink-swell	0.00	Too clayey	0.00
		Sodium content	0.97	Low strength	0.00	Sodium content	0.98
CaB:							
Caid	80	Fair		Poor		Fair	
		Organic matter content low	0.60	Low strength	0.00	Too clayey	0.81
		Too clayey	0.98	Shrink-swell	0.87		
CbB:							
Campbellton	70	Poor		Poor		Poor	
		Sodium content	0.00	Low strength	0.00	Sodium content	0.00
		Too clayey	0.00	Shrink-swell	0.87	Too clayey	0.00
		Salinity	0.88			Salinity	0.88
CcB:							
Catarina	90	Poor		Poor		Poor	
		Too clayey	0.00	Shrink-swell	0.00	Too clayey	0.00
		Sodium content	0.00	Low strength	0.00	Sodium content	0.00
		Salinity	0.50			Salinity	0.00
ChB:							
Chacon	80	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Salinity	0.88	Shrink-swell	0.12	Sodium content	0.90
		Organic matter content low	0.88				
CkB:							
Choke	70	Fair		Poor		Fair	
		Organic matter content low	0.12	Low strength	0.00	Too clayey	0.59
		Too clayey	0.68	Shrink-swell	0.89		
		Carbonate content	0.80				
ClA:							
Cochina, occasionally flooded	90	Poor		Poor		Poor	
		Too clayey	0.00	Shrink-swell	0.00	Too clayey	0.00
		Sodium content	0.00	Low strength	0.00	Sodium content	0.00
		Organic matter content low	0.88			Salinity	0.12

Table 23.--Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Reclamation Source		Roadfill Source		Topsoil Source	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CmA:							
Cochina, frequently flooded	90	Poor		Poor		Poor	
		Too clayey	0.00	Shrink-swell	0.00	Too clayey	0.00
		Sodium content	0.00	Low strength	0.00	Sodium content	0.00
		Organic matter content low	0.88			Salinity	0.12
CnB:							
Colmena	82	Fair		Fair		Good	
		Organic matter content low	0.60	Shrink-swell	0.87		
CoB:							
Conquista	95	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
				Shrink-swell	0.12		
CpC:							
Copita	80	Fair		Poor		Fair	
		Droughty	0.11	Depth to bedrock	0.00	Sodium content	0.90
		Carbonate content	0.80	Low strength	0.22	Depth to bedrock	0.92
		Organic matter content low	0.88			Carbonate content	0.96
CtA:							
Coquat, frequently flooded	85	Poor		Poor		Poor	
		Too clayey	0.00	Shrink-swell	0.00	Too clayey	0.00
		Sodium content	0.00	Low strength	0.00	Sodium content	0.00
		Salinity	0.88				
CuB:							
Cotulla	70	Poor		Poor		Poor	
		Too clayey	0.00	Shrink-swell	0.00	Too clayey	0.00
		Sodium content	0.00	Low strength	0.00	Sodium content	0.00
		Salinity	0.88			Salinity	0.00
CVB:							
Cotulla	70	Poor		Poor		Poor	
		Too clayey	0.00	Shrink-swell	0.00	Too clayey	0.00
		Sodium content	0.00	Low strength	0.00	Sodium content	0.00
		Salinity	0.88			Salinity	0.00
Maverick	20	Poor		Poor		Poor	
		Sodium content	0.00	Low strength	0.00	Sodium content	0.00
		Too clayey	0.00	Depth to bedrock	0.00	Salinity	0.00
		Salinity	0.50	Shrink-swell	0.12	Too clayey	0.00
CyB:							
Coy	90	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
				Shrink-swell	0.12		

Table 23.--Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Reclamation Source		Roadfill Source		Topsoil Source	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CZB:							
Czar-----------------	60	Good		Poor		Good	
				Low strength	0.00		
				Shrink-swell	0.62		
Clareville, rarely flooded------------	30	Fair		Poor		Fair	
		Too clayey	0.02	Low strength	0.00	Too clayey	0.02
				Shrink-swell	0.15		
DAM:							
Dams-----------------	100	Not rated		Not rated		Not rated	
DsB:							
Dosrios--------------	80	Poor		Poor		Poor	
		Sodium content	0.00	Low strength	0.00	Sodium content	0.00
		Too clayey	0.00	Shrink-swell	0.00	Too clayey	0.00
		Salinity	0.88				
EsB:							
Eloso----------------	70	Poor		Poor		Poor	
		Too clayey	0.00	Depth to bedrock	0.00	Too clayey	0.00
		Depth to bedrock	0.98	Low strength	0.00	Depth to bedrock	0.98
				Shrink-swell	0.12		
EvC:							
Esseville------------	75	Poor		Poor		Poor	
		Too clayey	0.00	Shrink-swell	0.00	Too clayey	0.00
		Organic matter content low	0.05	Depth to bedrock	0.00	Sodium content	0.40
		Sodium content	0.40	Low strength	0.00	Depth to bedrock	0.86
FaC:							
Fashing--------------	90	Poor		Poor		Poor	
		Too clayey	0.00	Depth to bedrock	0.00	Too clayey	0.00
		Sodium content	0.00	Low strength	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00	Shrink-swell	0.35	Salinity	0.00
FoB:							
Floresville, eroded-	75	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Organic matter content low	0.60	Shrink-swell	0.89		
HnC:							
Hindes---------------	85	Fair		Good		Poor	
		Carbonate content	0.92			Rock fragments	0.00
		Too clayey	0.08			Too clayey	0.06
		Droughty	0.86			Hard to reclaim (rock fragments)	0.88
HoB:							
Houla----------------	66	Fair		Poor		Good	
		Organic matter content low	0.82	Low strength	0.00		
		Carbonate content	0.92	Shrink-swell	0.88		

Table 23.--Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Reclamation Source		Roadfill Source		Topsoil Source	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
ImB:							
Imogene, occasionally flooded	80	Poor		Fair		Poor	
		Sodium content	0.00	Low strength	0.22	Sodium content	0.00
		Water erosion	0.99	Shrink-swell	0.87	Salinity	0.00
		Organic matter content low	0.88				
LaB:							
Laparita, rarely flooded	70	Poor		Poor		Poor	
		Too clayey	0.00	Shrink-swell	0.12	Too clayey	0.00
		Sodium content	0.48	Low strength	0.00	Sodium content	0.82
		Organic matter content low	0.88				
LeB:							
Lasalle	80	Poor		Poor		Poor	
		Too clayey	0.00	Shrink-swell	0.00	Too clayey	0.00
		Sodium content	0.00	Low strength	0.00	Sodium content	0.00
		Salinity	0.50			Salinity	0.00
LnB:							
Leoncita	85	Fair		Poor		Fair	
		Carbonate content	0.80	Low strength	0.00	Sodium content	0.98
		Organic matter content low	0.88	Shrink-swell	0.89		
		Sodium content	0.97				
LoC:							
Lomart	80	Fair		Poor		Fair	
		Droughty	0.01	Depth to bedrock	0.00	Depth to bedrock	0.08
		Organic matter content low	0.32				
		Depth to bedrock	0.08				
MaD:							
Mata	91	Fair		Poor		Poor	
		Organic matter content low	0.05	Low strength	0.00	Rock fragments	0.00
		Water erosion	0.99	Shrink-swell	0.80	Sodium content	0.90
		Carbonate content	0.80			Carbonate content	0.98
McC:							
Maverick	80	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Sodium content	0.00	Depth to bedrock	0.00	Sodium content	0.00
		Salinity	0.50	Shrink-swell	0.12	Salinity	0.00
MgD:							
Mirasol	85	Poor		Poor		Poor	
		Droughty	0.00	Depth to cemented pan	0.00	Depth to cemented pan	0.00
		Depth to cemented pan	0.00			Rock fragments	0.00
		Organic matter content low	0.18				

Table 23.--Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Reclamation Source		Roadfill Source		Topsoil Source	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
MoC:							
Moglia--------------	80	Poor		Poor		Poor	
		Sodium content	0.00	Low strength	0.00	Sodium content	0.00
		Too clayey	0.24	Shrink-swell	0.87	Too clayey	0.20
		Salinity	0.50			Salinity	0.50
MtB:							
Montell-------------	80	Poor		Poor		Poor	
		Too clayey	0.00	Shrink-swell	0.00	Too clayey	0.00
		Organic matter content low	0.18	Low strength	0.00	Sodium content	0.00
		Sodium content	0.00				
MwA:							
Monwebb, occasionally flooded------------	80	Poor		Poor		Poor	
		Too clayey	0.00	Shrink-swell	0.00	Too clayey	0.00
		Organic matter content low	0.18	Low strength	0.00	Carbonate content	0.99
		Carbonate content	0.88				
OmD:							
Olmedo	90	Poor		Poor		Poor	
		Droughty	0.00	Depth to cemented pan	0.00	Carbonate content	0.00
		Carbonate content	0.00			Rock fragments	0.00
		Depth to cemented pan	0.00			Depth to cemented pan	0.00
PIT:							
Pits----------------	100	Not rated		Not rated		Not rated	
PkC:							
Pavelek, severely eroded-------------	70	Poor		Poor		Poor	
		Droughty	0.00	Depth to cemented pan	0.00	Depth to cemented pan	0.00
		Carbonate content	0.00	Low strength	0.00	Too clayey	0.00
		Depth to cemented pan	0.00	Shrink-swell	0.87	Carbonate content	0.98
PrC:							
Pernitas------------	90	Fair		Poor		Good	
		Carbonate content	0.32	Low strength	0.00		
				Shrink-swell	0.87		
PtC:							
Pernitas------------	85	Fair		Fair		Fair	
		Organic matter content low	0.60	Shrink-swell	0.87	Too clayey	0.69
		Carbonate content	0.68				
		Too clayey	0.88				

Table 23.--Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Reclamation Source		Roadfill Source		Topsoil Source	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
RNB:							
Rhymes	60	Poor		Good		Fair	
		Wind erosion	0.00			Too sandy	0.01
		Too sandy	0.01				
		Organic matter content low	0.60				
Nusil	30	Poor		Good		Poor	
		Wind erosion	0.00			Too sandy	0.00
		Too sandy	0.00				
		Organic matter content low	0.60				
RoB:							
Rosenbrock	70	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Carbonate content	0.32	Shrink-swell	0.16		
SaB:							
Salco	85	Fair		Fair		Fair	
		Organic matter content low	0.05	Shrink-swell	0.87	Sodium content	0.98
		Carbonate content	0.92				
		Sodium content	0.97				
ScD:							
Sancajo	80	Poor		Poor		Poor	
		Droughty	0.00	Depth to cemented pan	0.00	Carbonate content	0.00
		Carbonate content	0.00			Rock fragments	0.00
		Depth to cemented pan	0.00			Depth to cemented pan	0.00
SrC:							
Sarnosa	80	Fair		Good		Good	
		Organic matter content low	0.14			No rock fragments	1.00
		Carbonate content	0.68				
StB:							
Sinton, frequently flooded	75	Fair		Good		Fair	
		Carbonate content	0.97			Carbonate content	0.97
TaB:							
Tela, occasionally flooded	70	Fair		Good		Good	
		Organic matter content low	0.60				
Tela, frequently flooded	20	Fair		Good		Good	
		Organic matter content low	0.60				

Table 23.--Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Reclamation Source		Roadfill Source		Topsoil Source	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
ToB:							
Tordia	90	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Organic matter content low	0.18	Shrink-swell	0.31		
		Salinity	0.88	Depth to bedrock	0.82		
VeC:							
Verick	80	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00			Rock fragments	0.97
		Organic matter content low	0.88				
VrC:							
Viboras	90	Poor		Poor		Poor	
		Too clayey	0.00	Depth to bedrock	0.00	Too clayey	0.00
		Organic matter content low	0.60	Low strength	0.00	Sodium content	0.00
		Droughty	0.12	Shrink-swell	0.12	Salinity	0.00
W:							
Water	100	Not rated		Not rated		Not rated	
WbB:							
Webb	85	Fair		Poor		Good	
		Water erosion	0.99	Low strength	0.00		
		Organic matter content low	0.88	Shrink-swell	0.84		
WeB:							
Weesatche	85	Fair		Fair		Good	
		Organic matter content low	0.75	Shrink-swell	0.88		
WeC:							
Weesatche	86	Fair		Fair		Good	
		Organic matter content low	0.75	Shrink-swell	0.87		
WgC:							
Weigang	87	Poor		Poor		Poor	
		Depth to bedrock	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Droughty	0.00	Low strength	0.00	Rock fragments	0.96
WhC:							
Whitsett	60	Fair		Poor		Fair	
		Droughty	0.19	Depth to bedrock	0.00	Too clayey	0.56
		Too clayey	0.68	Low strength	0.00	Depth to bedrock	0.68
		Depth to bedrock	0.68	Shrink-swell	0.94		
WPD:							
Whitsett	60	Fair		Poor		Fair	
		Droughty	0.19	Depth to bedrock	0.00	Depth to bedrock	0.68
		Depth to bedrock	0.68	Low strength	0.00	Too clayey	0.56
		Too clayey	0.68	Shrink-swell	0.94		

Table 23.--Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Reclamation Source		Roadfill Source		Topsoil Source	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Picosa	30	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00	Low strength	0.22	Rock fragments	0.72
ZaB:							
Zavala, frequently flooded	60	Good		Good		Good	
Zavala, occasionally flooded	20	Good		Good		Good	
ZvC:							
Zavco	90	Fair		Poor		Fair	
		Too clayey	0.32	Low strength	0.00	Too clayey	0.31
		Organic matter content low	0.88	Shrink-swell	0.87		
		Carbonate content	0.92				

Table 24.--Ponds and Embankments

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AgB:							
Aguilares	80	Somewhat limited		Very limited		Very limited	
		Seepage	0.70	Piping	1.00	Depth to water	1.00
				Salinity	0.50		
AlB:							
Alet, occasionally flooded	55	Somewhat limited		Not limited		Very limited	
		Seepage	0.81			Depth to water	1.00
Alet, frequently flooded	20	Somewhat limited		Not limited		Very limited	
		Seepage	0.81			Depth to water	1.00
AnC:							
Annarose	75	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Depth to water	1.00
ANS:							
Area not surveyed	100	Not rated		Not rated		Not rated	
BeC:							
Benavides	90	Somewhat limited		Not limited		Very limited	
		Seepage	0.57			Depth to water	1.00
		Slope	0.02				
BkB:							
Bookout	85	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Depth to water	1.00
BnB:							
Brennan	70	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.30	Piping	0.13	Depth to water	1.00
BrB:							
Brundage	80	Not limited		Very limited		Very limited	
				Piping	1.00	Depth to water	1.00
				Salinity	0.50		
BsB:							
Brystal	80	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.40	Depth to water	1.00
BuA:							
Buchel, occasionally flooded	85	Not limited		Very limited		Very limited	
				Hard to pack	1.00	Depth to water	1.00
BzA:							
Buchel, frequently flooded	95	Not limited		Very limited		Very limited	
				Hard to pack	1.00	Depth to water	1.00

Table 24.--Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CaB:							
Caid	80	Very limited		Not limited		Very limited	
		Seepage	1.00			Depth to water	1.00
CbB:							
Campbellton	70	Somewhat limited		Very limited		Very limited	
		Seepage	0.70	Piping	1.00	Depth to water	1.00
				Salinity	0.12		
CcB:							
Catarina	90	Not limited		Very limited		Very limited	
				Hard to pack	1.00	Depth to water	1.00
				Salinity	0.50		
ChB:							
Chacon	80	Not limited		Very limited		Very limited	
				Hard to pack	1.00	Depth to water	1.00
				Salinity	0.12		
CkB:							
Choke	70	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Salinity	0.06	Depth to water	1.00
				Piping	0.22		
ClA:							
Cochina, occasionally flooded	90	Not limited		Very limited		Very limited	
				Hard to pack	1.00	Depth to water	1.00
				Salinity	0.04		
CmA:							
Cochina, frequently flooded	90	Not limited		Very limited		Very limited	
				Hard to pack	1.00	Depth to water	1.00
				Salinity	0.04		
CnB:							
Colmena	82	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Piping	0.60	Depth to water	1.00
CoB:							
Conquista	95	Not limited		Somewhat limited		Very limited	
				Hard to pack	0.97	Depth to water	1.00
CpC:							
Copita	80	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Piping	0.58	Depth to water	1.00
		Depth to bedrock	0.03	Thin layer	0.68		
CtA:							
Coquat, frequently flooded	85	Not limited		Very limited		Very limited	
				Hard to pack	1.00	Slow refill	1.00
				Salinity	0.12	Salinity and saturated zone	0.50
						Depth to saturated zone	0.96
						Unstable excavation walls	0.10

Table 24.--Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CuB:							
Cotulla	70	Not limited		Very limited		Very limited	
				Hard to pack	1.00	Depth to water	1.00
				Salinity	0.12		
CVB:							
Cotulla	70	Not limited		Very limited		Very limited	
				Hard to pack	1.00	Depth to water	1.00
				Salinity	0.12		
Maverick	20	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.02	Hard to pack	1.00	Depth to water	1.00
				Salinity	0.50		
CyB:							
Coy	90	Not limited		Very limited		Very limited	
				Hard to pack	1.00	Depth to water	1.00
CZB:							
Czar	60	Very limited		Not limited		Very limited	
		Seepage	1.00			Depth to water	1.00
Clareville, rarely flooded	30	Somewhat limited		Very limited		Very limited	
		Seepage	0.03	Piping	1.00	Depth to water	1.00
DAM:							
Dams	100	Not rated		Not rated		Not rated	
DsB:							
Dosrios	80	Not limited		Very limited		Very limited	
				Hard to pack	1.00	Depth to water	1.00
				Salinity	0.12		
EsB:							
Eloso	70	Somewhat limited		Somewhat limited		Very limited	
		Depth to bedrock	0.02	Hard to pack	0.96	Depth to water	1.00
				Thin layer	0.59		
EvC:							
Esseville	75	Very limited		Very limited		Very limited	
		Gypsum content	1.00	Hard to pack	1.00	Depth to water	1.00
		Depth to bedrock	0.04	Salinity	0.10		
FaC:							
Fashing	90	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.53	Hard to pack	1.00	Depth to water	1.00
				Salinity	0.10		
FoB:							
Floresville, eroded	75	Somewhat limited		Not limited		Very limited	
		Seepage	0.03			Depth to water	1.00
HnC:							
Hindes	85	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Depth to water	1.00
		Slope	0.02				

Table 24.--Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
HoB:							
Houla	66	Very limited		Very limited		Very limited	
		Seepage	1.00	Piping	1.00	Depth to water	1.00
ImB:							
Imogene, occasionally flooded	80	Not limited		Very limited		Very limited	
				Piping	1.00	Depth to water	1.00
				Salinity	0.03		
LaB:							
Laparita, rarely flooded	70	Somewhat limited		Very limited		Very limited	
		Seepage	0.19	Salinity	0.03	Depth to water	1.00
				Piping	1.00		
LeB:							
Lasalle	80	Not limited		Very limited		Very limited	
				Hard to pack	1.00	Depth to water	1.00
				Salinity	0.50		
LnB:							
Leoncita	85	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.50	Depth to water	1.00
LoC:							
Lomart	80	Very limited		Very limited		Very limited	
		Seepage	1.00	Piping	1.00	Depth to water	1.00
		Depth to bedrock	0.31	Thin layer	0.98		
MaD:							
Mata	91	Somewhat limited		Very limited		Very limited	
		Seepage	0.70	Salinity	0.12	Depth to water	1.00
				Piping	1.00		
McC:							
Maverick	80	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.02	Hard to pack	1.00	Depth to water	1.00
				Salinity	0.50		
MgD:							
Mirasol	85	Very limited		Very limited		Very limited	
		Depth to cemented pan	1.00	Seepage	1.00	Depth to water	1.00
		Slope	0.32	Thin layer	1.00		
MoC:							
Moglia	80	Somewhat limited		Very limited		Very limited	
		Seepage	0.70	Salinity	0.50	Depth to water	1.00
				Piping	1.00		
MtB:							
Montell	80	Not limited		Very limited		Very limited	
				Hard to pack	1.00	Depth to water	1.00
				Salinity	0.50		

Table 24.--Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
MwA:							
Monwebb, occasionally flooded	80	Not limited		Very limited		Very limited	
				Hard to pack	1.00	Depth to water	1.00
				Salinity	0.03		
OmD:							
Olmedo	90	Very limited		Very limited		Very limited	
		Depth to cemented pan	1.00	Seepage	1.00	Depth to water	1.00
		Slope	0.32	Thin layer	1.00		
PIT:							
Pits	100	Very limited		Not rated		Not rated	
		Seepage	1.00				
PkC:							
Pavelek, severely eroded	70	Very limited		Very limited		Very limited	
		Depth to cemented pan	1.00	Thin layer	1.00	Depth to water	1.00
		Seepage	0.70	Hard to pack	0.91		
		Depth to bedrock	0.69				
		Slope	0.08				
PrC:							
Pernitas	90	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Depth to water	1.00
PtC:							
Pernitas	85	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Depth to water	1.00
RNB:							
Rhymes	60	Very limited		Not limited		Very limited	
		Seepage	1.00			Depth to water	1.00
Nusil	30	Very limited		Not limited		Very limited	
		Seepage	1.00			Depth to water	1.00
RoB:							
Rosenbrock	70	Somewhat limited		Very limited		Very limited	
		Seepage	0.70	Hard to pack	1.00	Depth to water	1.00
SaB:							
Salco	85	Somewhat limited		Very limited		Very limited	
		Seepage	0.70	Piping	1.00	Depth to water	1.00
ScD:							
Sancajo	80	Very limited		Very limited		Very limited	
		Depth to cemented pan	1.00	Thin layer	1.00	Depth to water	1.00
		Seepage	0.70	Large stones	0.99		
		Depth to bedrock	0.02				

Table 24.--Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SrC:							
Sarnosa	80	Very limited		Not limited		Very limited	
		Seepage	1.00			Depth to water	1.00
		Slope	0.02				
StB:							
Sinton, frequently flooded	75	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.30	Piping	0.21	Depth to water	1.00
TaB:							
Tela, occasionally flooded	70	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Depth to water	1.00
Tela, frequently flooded	20	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Depth to water	1.00
ToB:							
Tordia	90	Not limited		Very limited		Very limited	
				Hard to pack	1.00	Depth to water	1.00
				Salinity	0.12		
VeC:							
Verick	80	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.89	Seepage	1.00	Depth to water	1.00
		Slope	0.02	Thin layer	1.00		
				Piping	1.00		
VrC:							
Viboras	90	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.17	Salinity	1.00	Depth to water	1.00
				Hard to pack	1.00		
W:							
Water	100	Not rated		Not rated		Not rated	
WbB:							
Webb	85	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.12	Depth to water	1.00
WeB:							
Weesatche	85	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Depth to water	1.00
WeC:							
Weesatche	86	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Depth to water	1.00
		Slope	0.08				
WgC:							
Weigang	87	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.52	Thin layer	1.00	Depth to water	1.00
				Piping	0.10		

Table 24.--Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
WhC:							
Whitsett------------	60	Somewhat limited		Somewhat limited		Very limited	
		Depth to bedrock	0.08	Thin layer	0.82	Depth to water	1.00
WPD:							
Whitsett------------	60	Somewhat limited		Somewhat limited		Very limited	
		Depth to bedrock	0.08	Thin layer	0.82	Depth to water	1.00
Picosa--------------	30	Somewhat limited		Very limited		Very limited	
		Seepage	0.53	Thin layer	1.00	Depth to water	1.00
		Slope	0.18	Piping	0.08		
		Depth to bedrock	0.89				
ZaB:							
Zavala, frequently flooded------------	60	Very limited		Not limited		Very limited	
		Seepage	1.00			Depth to water	1.00
Zavala, occasionally flooded------------	20	Very limited		Not limited		Very limited	
		Seepage	1.00			Depth to water	1.00
ZvC:							
Zavco---------------	90	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.10	Depth to water	1.00

Table 25.--Engineering Soil Properties

(Absence of an entry indicates that the data were not estimated. The asterisk '*' denotes the representative texture; other possible textures follow the dash.)

AgB: Aguilares	0-4	*Fine sandy loam	*SM, SC-SM	*A-2-4, A-4	0	0-2	75-100	75-100	50-95	25-50	20-30	8-15
	4-12	*Fine sandy loam, Sandy clay loam	*SC-SM, SC, CL	*A-4, A-6	0	0-5	75-100	75-100	50-95	50-80	28-39	14-28
	12-39	*Sandy clay loam, Clay loam	*CL	*A-6	0	0-2	75-100	75-95	50-90	50-80	25-40	11-24
	39-80	*Sandy clay loam, Fine sandy loam, clay loam	*CL, SC, SM, SC-SM	*A-6, A-4 A-7-6	0	0-2	75-100	75-100	51-100	40-70	25-45	8-25
AlB: Alet, occasionally flooded	0-4	*Sandy clay loam	*SC, CL	*A-6	0	0	100	100	84-91	40-47	32-39	13-18
	4-49	*Sandy clay loam, Clay loam	*SC, CL	*A-6, A-7-6	0	0	100	100	83-93	41-51	35-49	17-24
	49-80	*Sandy clay loam, Loam, clay loam	*SC, CL	*A-6, A-7-6	0	0	100	100	79-94	36-51	30-45	13-25
Alet, frequently flooded	0-4	*Sandy clay loam	*SC, CL	*A-6	0	0	100	100	84-91	40-47	32-39	13-18
	4-49	*Sandy clay loam, Clay loam	*SC, CL	*A-6, A-7-6	0	0	100	100	83-93	41-51	35-49	17-24
	49-80	*Sandy clay loam, Loam, clay loam	*SC, CL	*A-6, A-7-6	0	0	100	100	79-94	36-51	30-45	13-25
AnC: Annarose	0-7	*Fine sandy loam	*SC-SM, SM, CL-ML	*A-4	0	0	100	100	90-96	41-51	23-33	7-12
	7-23	*Loam, Sandy clay loam, fine sandy loam	*CL, SC-SM, SC, CL-ML	*A-6, A-4	0	0	94-100	83-100	70-94	50-70	25-35	7-15
	23-47	*Fine sandy loam, Loamy fine sand	*SM, SC-SM	*A-4, A-2-4	0	0	95-100	90-100	90-100	22-34	21-30	5-11
	47-80	*Fine sandy loam, Loamy fine sand	*SC-SM, SM	*A-4, A-2-4	0	0	100	100	84-98	34-47	0-25	NP-12
ANS: Area not surveyed	---	---	---	---	---	---	---	---	---	---	---	---
BeC: Benavides	0-9	*Fine sandy loam	*SC-SM, SM	*A-4	0	0	100	90-100	70-80	35-50	20-30	4-11
	9-33	*Sandy clay loam	*SC, CL	*A-6	0	0	100	90-100	70-80	35-50	30-40	11-20
	33-45	*Clay loam	*CL	*A-6	0	0	100	90-100	75-85	35-45	30-40	11-20
	45-80	*Sandy clay loam	*CL, SC	*A-6	0	0	95-100	90-100	75-95	35-50	25-40	11-23

Table 25.--Engineering Soil Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
BkB: Bookout	0-16	*Clay loam	*CL	*A-6, A-7-6	0	0	90-100	85-100	75-100	60-90	31-48	13-25
	16-80	*Clay, Silty clay, silty clay loam	*CH, CL	*A-7-6, A-6	0	0	90-100	85-100	75-100	70-95	31-48	15-25
BnB: Brennan	0-7	*Fine sandy loam	*SC-SM, SM,	*A-4, A-2-4	0	0	100	98-100	70-100	20-45	16-30	NP-9
	7-37	*Sandy clay loam, Loam	*SC, CL	*A-6, A-2-4	0	0	100	90-100	60-100	30-59	22-39	8-22
	37-80	*Sandy clay loam, Clay loam, loam	*CL, SC	*A-6, A-7-6, A-4	0	0	100	90-100	60-100	30-59	29-44	13-24
BrB: Brundage	0-5	*Fine sandy loam	*SC-SM, SM	*A-4	0	0	100	95-100	85-100	30-60	21-33	6-13
	5-13	*Sandy clay loam, Clay loam	*SC, CL	*A-6, A-7-6	0	0	95-100	95-100	80-95	36-55	33-47	15-25
	13-47	*Sandy clay loam, Clay loam, fine sandy loam	*CL, SC	*A-6, A-7-6	0	0	95-100	95-100	90-100	40-65	33-47	15-25
	47-80	*Sandy clay loam, Clay loam	*CL, SC	*A-6, A-7-6	0	0	98-100	95-100	85-98	40-60	32-45	13-23
BsB: Brystal	0-7	*Fine sandy loam	*SM	*A-4	0	0	98-100	98-100	70-95	25-45	18-32	3-13
	7-33	*Sandy clay loam, Loam	*SC, CL	*A-6, A-2-6, A-7-6	0	0	98-100	96-100	75-95	30-75	27-43	12-22
	33-80	*Sandy clay loam, Fine sandy loam, loam	*SC, CL, SM, SC-SM	*A-6, A-2-4, A-4	0	0	98-100	96-100	70-95	30-75	25-43	9-22
BuA: Buchel, occasionally flooded	0-8	*Clay	*CH	*A-7-6	0	0	95-100	95-100	90-100	75-95	55-75	32-48
	8-42	*Clay, Silty clay	*CH	*A-7-6	0	0	95-100	95-100	90-100	75-95	55-75	32-48
	42-74	*Clay	*CH	*A-7-6	0	0	95-100	95-100	90-100	75-95	55-75	32-48
	74-80	*Clay, Silty clay	*CH	*A-7-6	0	0	95-100	95-100	90-100	75-95	55-75	32-48
BzA: Buchel, frequently flooded	0-8	*Clay	*CH	*A-7-6	0	0	95-100	89-100	82-100	70-94	55-82	29-40
	8-53	*Clay, Silty clay	*CH	*A-7-6	0	0	95-100	89-100	74-100	63-91	53-83	29-44
	53-80	*Clay, Silty clay	*CH	*A-7-6	0	0	95-100	90-100	74-100	63-91	52-82	29-43

Table 25.--Engineering Soil Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
CaB: Caid------------	0-10	*Sandy clay loam	*SC, CL	*A-6,	0	0	95-100	90-100	76-93	39-52	31-39	13-20
	10-28	*Sandy clay loam, Clay loam	*SC, CL	*A-6, A-7-6	0	0	97-100	95-100	90-100	40-80	38-49	19-25
	28-80	*Clay loam, Sandy clay loam	*CL, SC	*A-7-6, A-6	0	0	97-100	90-100	90-100	40-90	34-47	16-25
CbB: Campbellton-----	0-5	*Clay loam	*CL	*A-6	0	0	98-100	95-100	80-95	60-80	30-40	11-20
	5-28	*Clay, Clay loam	*CL, CH	*A-7-6,	0	0	98-100	95-100	85-98	70-90	41-55	20-30
	28-63	*Clay loam, Clay	*CL	*A-6, A-7-6	0	0	98-100	95-100	80-95	60-80	30-45	11-22
	63-80	*Clay	*CL	*A-6, A-7-6	0	0-3	90-100	80-100	75-100	75-98	56-80	33-54
CcB: Catarina--------	0-3	*Clay	*CH	*A-7-6	0	0-2	85-100	82-100	82-100	80-98	51-76	30-49
	3-73	*Silty clay, Clay	*CH	*A-7-6	0	0-2	85-100	82-100	82-100	80-98	51-76	30-49
	73-80	*Clay, Silty clay loam, silty clay	*CH, CL	*A-7-6	0	0-1	95-100	90-100	85-100	80-95	44-66	30-49
ChB: Chacon----------	0-11	*Sandy clay loam	*CL, SC	*A-6	0	0	97-100	95-100	65-100	52-85	33-39	14-37
	11-44	*Clay, Clay loam, sandy clay	*CH, CL	*A-7-6	0	0	96-100	91-100	79-100	63-84	46-62	25-36
	44-80	*Sandy clay loam, Clay, clay loam	*CL, CH. SC	*A-6, A-7-6	0	0	90-100	80-100	66-100	52-85	41-61	21-37
CkB: Choke-----------	0-10	*Silty clay loam	*CH, CL	*A-7-6, A-6	0	0-1	98-100	95-100	85-100	60-95	38-56	19-33
	10-24	*Silty clay loam, Silt loam, loam	*CL, CH	*A-7-6, A-6	0	0-1	98-100	95-100	85-100	60-90	38-56	19-33
	24-34	*Silty clay loam	*CL, CH	*A-7-6, A-6	0	0-1	98-100	95-100	85-100	60-90	38-56	19-33
	34-48	*Silt loam, Silty clay loam, loam	*CL, CH	*A-4, A-7-6, A-6	0	0-1	98-100	95-100	85-100	60-90	38-56	15-33
	48-73	*Loam	*CL	*A-6	0	0-1	98-100	95-100	85-100	60-90	30-39	15-28
	73-80	*Silt loam, Loam	*CL, ML-CL	*A-6	0	0-1	95-100	90-100	85-100	60-90	30-39	15-28
ClA: Cochina, occasionally flooded--------	0-4	*Clay	*CH	*A-7-6, A-7-5	0	0	80-100	75-100	75-100	70-100	51-80	28-45
	4-33	*Clay	*CH	*A-7-6	0	0	80-100	75-100	75-100	70-100	51-80	35-55
	33-80	*Clay	*CH	*A-7-6	0	0	80-100	75-100	75-100	70-100	65-97	40-61

Table 25.--Engineering Soil Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
CmA: Cochina, frequently flooded	0-4	*Clay	*CH	*A-7-6, A-7-5	0	0	80-100	75-100	75-100	70-100	51-80	28-45
	4-33	*Clay	*CH	*A-7-6	0	0	80-100	75-100	75-100	70-100	51-80	35-55
	33-80	*Clay	*CH	*A-7-6	0	0	80-100	75-100	75-100	70-100	51-80	35-55
CnB: Colmena	0-9	*Fine sandy loam	*SC-SM, SM	*A-4	0	0	100	100	91-100	38-50	24-47	7-16
	9-29	*Sandy clay loam	*SC, CL	*A-6	0	0	100	95-100	76-90	39-51	33-39	13-21
	29-40	*Sandy clay loam	*SC, CL	*A-6	0	0	100	100	81-94	43-56	32-39	15-25
	40-80	*Sandy clay loam, Fine sandy loam	*SC, CL	*A-6, A-4	0	0	95-100	86-100	67-94	36-58	30-39	13-25
CoB: Conquista	0-19	*Clay	*CH	*A-7-6	0	0	95-100	95-100	85-100	65-85	56-71	33-45
	19-80	*Clay, Silty clay loam, clay loam	*CH	*A-7-6	0	0	100	95-100	95-100	75-95	56-66	33-41
CpC: Copita	0-9	*Sandy clay loam	*SC	*A-2-4, A-6	0	0	95-100	93-100	90-100	25-50	25-37	9-17
	9-35	*Sandy clay loam	*CL, SC	*A-6, A-7-6	0	0	95-100	93-100	90-100	40-82	25-43	11-28
	35-80	*Bedrock			---	---	---	---	---	---	---	---
CtA: Coquat, frequently flooded	0-5	*Clay	*CH	*A-7-6	0	0	85-100	85-100	80-100	75-100	51-79	35-50
	5-36	*Clay	*CH	*A-7-6	0	0	85-100	85-100	80-100	75-100	51-79	35-50
	36-80	*Clay	*CH	*A-7-6	0	0	85-100	85-100	80-100	75-100	51-75	35-50
CuB: Cotulla	0-4	*Clay loam	*CH	*A-7-6	0	0	82-100	75-100	52-95	43-92	51-70	29-46
	4-71	*Clay	*CH	*A-7-6	0	0	82-100	75-100	46-98	36-90	51-70	29-46
	71-80	*Clay, Clay loam	*CH, CL	*A-7-6	0	0-3	90-100	80-100	75-100	75-96	45-69	25-44
CVB: Cotulla	0-4	*Clay loam	*CH	*A-7-6	0	0	82-100	75-100	52-95	43-92	51-70	29-46
	4-71	*Clay	*CH	*A-7-6	0	0	82-100	75-100	46-98	36-90	51-70	29-46
	71-80	*Clay, Clay loam	*CH, CL	*A-7-6	0	0-3	90-100	80-100	75-100	75-96	45-69	25-44
Maverick	0-15	*Clay	*CH, CL	*A-7-6	0	0	75-100	65-100	55-100	51-100	46-62	25-36
	15-33	*Clay, Silty clay, clay loam	*CH	*A-7-6	0	0	98-100	95-100	90-100	80-100	50-62	29-36
	33-38	*Clay, Silty clay, clay loam	*CH	*A-7-6	0	0	98-100	90-100	85-100	75-95	50-66	29-40
	38-80	*Clay	*CH	*A-7-6	0	0	90-100	85-100	80-100	60-95	55-70	32-44

Table 25.--Engineering Soil Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
CyB:												
Coy	0-8	*Clay loam	*CL, CH	*A-7-6, A-6	0	0	98-100	97-100	95-100	70-85	39-64	19-36
	8-48	*Clay, Sandy clay, clay loam	*CH, CL	*A-7-6	0	0	98-100	97-100	95-100	70-90	46-74	25-45
	48-80	*Clay, Silty clay	*CH	*A-7-6	0	0	98-100	97-100	95-100	70-90	50-66	29-40
CZB:												
Czar	0-5	*Sandy clay loam	*CL, SC	*A-6	0	0	100	95-100	95-100	45-70	33-40	13-21
	5-22	*Sandy clay loam, Clay loam	*CL, CH	*A-6, A-7-6	0	0	100	95-100	90-100	51-80	36-51	17-25
	22-80	*Clay loam, Sandy clay loam	*CL	*A-7-6, A-6	0	0	90-100	80-100	80-100	51-75	36-48	17-25
Clareville, rarely flooded	0-12	*Sandy clay loam	*CL	*A-6	0	0	100	100	80-99	50-65	31-39	17-25
	12-41	*Clay loam, Clay	*CH, CL	*A-7-6,	0	0	100	100	90-100	57-67	47-61	25-32
	41-80	*Sandy clay loam, Clay, clay loam	*CL, CH	*A-6, A-7-6	0	0	100	98-100	85-95	50-71	42-59	21-33
DAM:												
Dams	---	---	---	---	---	---	---	---	---	---	---	---
DsB:												
Dosrios	0-8	*Clay	*CH, CL	*A-7-6	0	0-3	98-100	95-100	80-100	75-90	49-81	25-42
	8-30	*Clay, Clay loam	*CH, CL	*A-7-6	0	0-3	90-100	80-100	75-100	75-96	48-84	25-46
	30-54	*Clay, Clay loam	*CH, CL	*A-7-6	0	0-3	90-100	80-100	75-100	75-96	48-80	25-46
	54-70	*Clay, Clay loam	*CH, CL	*A-7-6	0	0-3	90-100	80-100	75-100	75-96	45-69	25-44
	70-80	*Clay	*CH	*A-7-6	0	0	100	100	86-100	73-98	42-64	24-43
EsB:												
Eloso	0-9	*Clay	*CH	*A-7-6	0	0	100	100	95-100	75-90	56-66	33-41
	9-37	*Clay	*CH	*A-7-6	0	0	100	95-100	95-100	75-95	56-66	33-41
	37-80	*Bedrock			---	---	---	---	---	---	---	---
EvC:												
Esseville	0-10	*Clay	*CH	*A-7-6	0	0-3	98-100	95-100	80-100	75-90	51-75	30-50
	10-24	*Clay	*CH	*A-7-6	0	0-3	90-100	80-100	75-100	75-98	56-80	33-54
	24-34	*Clay	*CH	*A-7-6	0	0-3	90-100	80-100	75-100	75-98	56-80	33-54
	34-80	*Gypsiferous clay	*CH	*A-7-6	0	0-3	90-100	80-100	75-100	75-98	56-80	33-54
FaC:												
Fashing	0-7	*Clay	*CH	*A-7-6	0	0	98-100	96-100	95-100	80-100	50-66	29-41
	7-12	*Clay	*CH, CL	*A-7-6	0	0	100	100	88-100	71-85	45-62	26-37
	12-80	*Clay	*CH	*A-7-6	0	0	90-100	80-100	75-100	75-98	62-86	40-59

Table 25.--Engineering Soil Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
FoB: Floresville, eroded---------	0-11	*Fine sandy loam	*CL-ML, SC-SM	*A-4	0	0-1	96-100	96-100	60-99	35-74	18-25	4-10
	11-31	*Clay, Sandy clay	*CL, CH	*A-7-6, A-6	0	0-1	96-100	96-100	80-100	51-79	35-55	20-35
	31-80	*Sandy clay loam, Clay loam	*CL, SC	*A-6, A-7-6	0	0-1	96-100	96-100	70-100	36-82	25-50	8-30
HnC: Hindes----------	0-4	*Very gravelly sandy clay loam	*GP-GC, GC	*A-2-7, A-2-6	0	0-20	35-95	15-50	15-45	10-25	29-49	12-24
	4-12	*Very gravelly clay loam, Extremely gravelly clay loam, extremely gravelly clay, very gravelly clay	*GC	*A-2-7	0	0-20	20-70	20-50	20-45	15-45	43-66	24-39
	12-26	*Very gravelly clay loam, Clay loam, loam	*GC	*A-2-7, A-6, A-2-6, A-2-4	0	0-20	50-95	50-90	35-75	30-75	28-50	12-28
	26-80	*			---	---	---	---	---	---	---	---
HoB: Houla-----------	0-7	*Clay loam	*CL, CH	*A-7-6, A-6	0	0	90-100	90-100	85-100	75-95	37-55	17-28
	7-15	*Clay loam, Loam, silty clay loam	*CL	*A-7-6, A-6	0	0	90-100	85-100	75-100	70-95	37-54	17-27
	15-58	*Silty clay loam, Fine sandy loam, clay loam	*CL, SM	*A-6, A-4	0	0	90-100	85-100	75-100	70-95	27-43	10-21
	58-80	*Fine sandy loam, Silt loam, loam	*CL-ML, CL, ML	*A-4, A-6	0	0	95-100	90-100	85-100	55-82	20-31	5-13
ImB: Imogene, occasionally flooded--------	0-4	*Fine sandy loam	*CL-ML, SC-SM	*A-4	0	0	100	95-100	70-95	40-70	22-35	6-12
	4-13	*Sandy clay loam, Sandy clay, clay loam	*CL, SC	*A-6, A-7-6	0	0	100	95-100	80-100	45-75	32-53	13-29
	13-53	*Sandy clay loam, Clay loam	*CL, SC	*A-6, A-7-6	0	0	95-100	90-100	75-95	40-70	32-46	13-24
	53-80	*Sandy clay loam, Clay loam, loam	*CL, SC	*A-6, A-7-6	0	0	90-100	85-100	75-95	40-70	27-46	10-24

Table 25.--Engineering Soil Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
LaB: Laparita, rarely flooded	0-4	*Clay loam	*CL	*A-6	0	0	90-100	90-100	90-100	70-80	25-40	8-20
	4-31	*Clay, Clay loam, sandy clay	*CL, CH	*A-7-6	0	0	90-100	90-100	90-100	75-95	41-55	20-30
	31-60	*Clay loam, Clay, sandy clay loam	*CL, CH	*A-7-6, A-6	0	0	90-100	90-100	90-100	70-80	35-55	18-28
	60-80	*Clay, Clay loam, sandy clay loam	*CH, CL	*A-7-6, A-6	0	0	90-100	90-100	90-100	75-95	30-64	15-42
LeB: Lasalle	0-5	*Clay	*CH	*A-7-6	0	0	80-100	75-100	75-100	75-100	51-70	29-46
	5-24	*Clay	*CH	*A-7-6	0	0	80-100	75-100	75-100	75-100	51-70	29-46
	24-80	*Clay	*CH	*A-7-6	0	0	80-100	75-100	75-100	75-100	51-70	29-46
LnB: Leoncita	0-11	*Fine sandy loam	*SM, SC-SM	*A-4	0	0	100	95-100	90-100	36-50	20-30	4-11
	11-41	*Sandy clay loam, Clay loam	*CL, SC	*A-6	0	0	100	95-100	90-100	36-80	30-40	11-20
	41-80	*Sandy clay loam, Loam, clay loam	*CL, SC	*A-6, A-7-6	0	0	90-100	80-100	75-99	44-80	30-44	11-23
LoC: Lomart	0-8	*Loam	*CL, SC-SM	*A-4, A-6	0	0	95-100	90-100	72-94	46-64	23-37	7-17
	8-24	*Loam, Fine sandy loam, paragravelly loam, paragravelly fine sandy loam, very paragravelly loam	SC-SM, SC, SM	*A-4, A-6	0	0	100	100	78-86	48-56	19-28	4-10
	24-80	*Bedrock			---	---	---	---	---	---	---	---
MaD: Mata	0-14	*Very gravelly sandy clay loam	*GC	*A-6	0	0-5	60-95	55-85	45-75	25-55	32-39	18-24
	14-31	*Very gravelly sandy clay loam, Very gravelly clay loam, extremely gravelly clay loam	*GC, GP-GC	*A-2-6 A-7-6, A-6	0	0-10	25-75	15-65	15-60	10-45	36-52	18-28
	31-43	*Gravelly clay loam	*SC, CL, CH,	*A-7-6, A-2-6	0	0-10	50-95	35-80	30-70	26-56	39-53	19-29
	43-80	*Clay, Clay loam	*CH, CL	*A-7-6	0	0-3	90-100	80-100	75-100	75-96	45-69	25-44

Table 25.--Engineering Soil Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
McC: Maverick	0-15	*Clay	*CH, CL	*A-7-6	0	0	75-100	65-100	55-100	51-100	46-62	25-36
	15-33	*Clay, Silty clay	*CH	*A-7-6	0	0	98-100	95-100	90-100	80-100	50-62	29-36
	33-38	*Clay, Silty clay, clay loam	*CH	*A-7-6	0	0	98-100	90-100	85-100	75-95	50-66	29-40
	38-80	*Clay	*CH	*A-7-6,	0	0	90-100	85-100	80-100	60-95	55-70	32-44
MgD: Mirasol	0-6	*Gravelly sandy loam	*GC-GM, GM, GC	*A-4, A-2-4, A-1-b	0	0-5	25-80	25-70	25-65	20-56	16-35	NP-10
	6-16	*Very gravelly sandy loam, Very gravelly sandy clay loam, very gravelly loam	*GC, GP-GC	*A-2-6, A-2-4	0	0-10	20-80	20-75	20-50	10-25	25-40	8-18
	16-19	*Cemented material			---	---	---	---	---	---	---	---
	19-80	*Cemented material			---	---	---	---	---	---	---	---
MoC: Moglia	0-6	*Sandy clay loam	*CL, SC	*A-6	0	0	90-100	90-100	75-100	55-85	28-39	12-31
	6-30	*Clay loam, Clay	*CL, CH	*A-7-6	0	0	95-100	90-100	80-100	65-95	41-58	24-36
	30-80	*Loam, Clay loam	*CL	*A-6, A-7-6	0	0-2	80-100	75-100	70-100	60-90	28-48	12-30
MtB: Montell	0-17	*Clay	*CH	*A-7-6	0	0	98-100	95-100	91-100	85-100	51-70	29-46
	17-39	*Clay, Silty clay	*CH	*A-7-6	0	0	98-100	95-100	91-100	85-100	51-70	29-46
	39-80	*Clay, Silty clay	*CH	*A-7-6	0	0	98-100	95-100	91-100	80-100	51-74	29-49
MwA: Monwebb, occasionally flooded	0-15	*Clay	*CH	*A-7-6	0	0	98-100	95-100	91-100	85-100	51-70	29-46
	15-40	*Clay	*CH	*A-7-6	0	0	98-100	95-100	91-100	85-100	51-70	29-46
	40-80	*Clay, Silty clay	*CH	*A-7-6	0	0	98-100	95-100	91-100	80-100	51-74	29-49
OmD: Olmedo	0-6	*Very gravelly loam	*GC-GM, GM, GP-GC	*A-1-a, A-4	0-10	0-30	48-75	8-55	7-55	4-50	18-30	4-18
	6-12	*Extremely gravelly fine sandy loam, Extremely gravelly sandy clay loam	*GP-GC, GC, GC-GM	*A-2-6, A-4, A-2-4	0-10	0-30	25-75	20-55	15-55	10-50	18-43	4-18
	12-38	*Cemented material			---	---	---	---	---	---	---	---
	38-80	*Very gravelly cemented material			---	---	---	---	---	---	---	---

Table 25.--Engineering Soil Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
PIT:												
Pits------------	0-80	*Variable			---	---	---	---	---	---	---	---
PkC:												
Pavelek, severely eroded	0-4	*Clay loam	*CH	*A-7-6	0	0	95-100	75-100	75-100	70-80	56-66	33-41
	4-11	*Clay, Clay loam	*CH	*A-7-6	0	0	95-100	75-100	55-65	45-55	51-66	29-41
	11-14	*Cemented material			---	---	---	---	---	---	---	---
	14-80	*Bedrock			---	---	---	---	---	---	---	---
PrC:												
Pernitas--------	0-7	*Fine sandy loam	*SM, SC-SM	*A-2-4, A-4,	0	0	100	100	95-100	30-40	20-30	4-11
	7-35	*Sandy clay loam, Clay loam	*CL, CH, SC	*A-6, A-7-6	0	0	98-100	96-100	90-99	53-75	33-57	16-33
	35-58	*Clay loam, Sandy clay loam	*CL, SC, CH	*A-7-6, A-6	0	0	90-100	90-99	80-98	45-70	30-55	18-32
	58-80	*Sandy clay loam	*CL, SC	*A-6	0	0	75-100	70-99	60-98	40-67	32-39	17-27
PtC:												
Pernitas--------	0-7	*Sandy clay loam	*SC, CL	*A-6	0	0	100	100	95-100	36-55	24-37	9-20
	7-16	*Clay loam	*CL,	*A-7-6, A-6	0	0	98-100	96-100	90-98	53-75	33-57	16-33
	16-38	*Sandy clay loam, Clay loam	*CL, SC, CH	*A-6, A-7-6	0	0	90-100	90-99	80-99	45-70	30-55	18-32
	38-80	*Sandy clay loam, Sandy clay	*SC, CL	*A-6, A-7-6	0	0	80-100	55-100	44-94	25-59	32-47	14-25
RNB:												
Rhymes----------	0-6	*Fine sand	*SM	*A-2-4	0	0	100	100	50-80	15-35	16-20	NP-3
	6-43	*Loamy sand, Loamy fine sand, fine sand	*SM	*A-2-4, A-3	0	0	100	100	50-80	15-35	16-20	NP-3
	43-80	*Sandy clay loam, Fine sandy loam	*SC, CL, SM	*A-6, A-2-4, A-4	0	0	100	100	80-90	35-55	25-38	8-15
Nusil-----------	0-9	*Fine sand	*SM,	*A-2-4,	0	0	100	100	90-99	12-21	0-24	NP-6
	9-25	*Fine sand, Loamy fine sand	*SC-SM	*A-2-4,	0	0	100	100	88-100	12-24	0-27	NP-8
	25-43	*Sandy clay loam, Fine sandy loam	*CL, SC	*A-6, A-7-6	0	0	100	100	78-95	42-59	29-47	12-25
	72-80	*Sandy clay loam, Fine sandy loam	*SC, CL, SM	*A-6, A-4	0	0	100	100	79-94	41-56	27-43	10-21
RoB:												
Rosenbrock------	0-6	*Clay	*CH	*A-7-6	0	0	100	100	95-100	80-90	56-66	33-41
	6-44	*Clay, Silty clay	*CH	*A-7-6	0	0	100	100	95-100	85-95	61-76	36-49
	44-56	*Clay	*CH	*A-7-6	0	0	100	100	90-100	85-95	61-76	36-49
	56-63	*Clay loam	*CL, CH	*A-7-6, A-6	0	0	100	99-100	90-100	85-95	36-51	17-28
	63-80	*Silt loam, Loam	*CL, CL-ML	*A-4, A-6	0	0	100	98-100	85-95	70-80	20-30	5-12

Table 25.--Engineering Soil Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
SaB:												
Salco-----------	0-10	*Fine sandy loam	*SM, SC-SM	*A-4	0	0-2	86-100	69-100	62-97	26-45	26-39	7-14
	10-20	*Clay loam, Fine sandy loam, sandy clay loam	*CL, SC, SM, SC-SM	*A-7-6, A-6, A-4	0	0	100	100	88-96	69-77	38-48	19-25
	20-45	*Sandy clay loam, Clay loam	*CL, SC	*A-6	0	0-3	80-100	80-100	65-90	40-70	31-47	13-25
	45-80	*Fine sandy loam, Loam, sandy clay loam	*SC-SM, CL-ML, SM CL	*A-4, A-2-4	0	0-3	86-100	68-100	60-98	26-51	18-29	2-10
ScD:												
Sancajo---------	0-6	*Very gravelly loam	*GC, GC-GM	*A-2-6, A-6, A-2-4	0-10	0-30	35-75	25-55	25-55	20-50	25-35	7-15
	6-11	*Extremely cobbly loam	*GC, GC-GM	*A-2-6, A-6, A-2-4	0	60-90	35-75	25-55	25-55	20-50	25-35	7-15
	11-18	*Cemented material			---	---	---	---	---	---	---	---
	18-38	*Silt loam, Loam	*CL, CL-ML	*A-4, A-6	0	0	100	98-100	98-100	70-80	20-30	5-12
	38-80	*Bedrock			---	---	---	---	---	---	---	---
SrC:												
Sarnosa---------	0-15	*Fine sandy loam	*SM, SC-SM	*A-2-4, A-4	0	0	95-100	90-100	80-99	24-36	20-30	5-12
	15-30	*Fine sandy loam, Sandy clay loam	*SM, SC-SM, SC, CL	*A-4, A-2-6, A-6	0	0	95-100	83-100	72-100	27-48	25-30	11-18
	30-51	*Fine sandy loam, Sandy clay loam	*SC-SM, SC	*A-4, A-2-4	0	0	84-100	67-100	60-100	24-50	20-30	4-10
	51-80	*Sandy clay loam, Fine sandy loam	*CL, SC, SM, SC-SM	*A-6, A-4	0	0	100	100	86-100	43-58	20-30	4-15
StB:												
Sinton, frequently flooded--------	0-9	*Sandy clay loam	*CL, CL-ML	*A-6	0	0	100	100	90-99	70-80	21-39	6-24
	9-80	*Sandy clay loam, Clay loam	*CL, SC	*A-6, A-7-6	0	0	100	96-100	90-100	70-80	28-40	11-23
TaB:												
Tela, occasionally flooded--------	0-8	*Sandy clay loam	*SC	*A-6	0	0	100	100	80-90	40-50	27-35	11-18
	4-16	*Sandy clay loam, Clay loam	*CL, SC	*A-6	0	0	100	100	90-100	45-65	27-40	11-21
	16-80	*Sandy clay loam	*SC, CL	*A-6	0	0	100	100	80-94	41-55	27-40	11-21

Table 25.--Engineering Soil Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
Tela, frequently flooded	0-8	*Sandy clay loam	*SC	*A-6	0	0	100	100	80-90	40-50	27-35	11-18
	8-16	*Sandy clay loam, Clay loam	*CL, SC	*A-6	0	0	100	100	90-100	45-65	27-40	11-21
	16-80	*Sandy clay loam	*SC	*A-6	0	0	100	92-100	73-94	38-55	27-40	11-21
ToB: Tordia	0-7	*Clay	*CH	*A-7-6	0	0-2	95-100	95-100	90-100	75-90	55-75	31-48
	7-20	*Clay	*CH	*A-7-6	0	0-2	95-100	95-100	90-100	75-95	55-75	31-48
	20-39	*Clay	*CH	*A-7-6	0	0-2	95-100	95-100	90-100	85-95	55-75	31-48
	39-53	*Clay, Silty clay	*CH	*A-7-6	0	0-5	95-100	95-100	90-100	85-95	55-75	31-48
	53-80	*Clay, Clay loam	*CH, CL	*A-7-6	0	0-3	90-100	80-100	75-100	75-96	45-69	25-44
VeC: Verick	0-2	*Fine sandy loam	*SC-SM, SM	*A-2-4, A-4	0	0-5	95-100	75-100	75-100	30-40	23-31	7-9
	2-8	*Sandy clay loam, Fine sandy loam, loam	*CL, SC-SM, SM	*A-6, A-4	0	0-10	90-100	75-100	70-100	36-70	17-40	7-21
	8-80	*Bedrock			---	---	---	---	---	---	---	---
VrC: Viboras	0-6	*Clay	*CH, CL	*A-7-6	0	0	90-100	90-100	85-100	65-95	46-72	25-46
	6-28	*Clay	*CH	*A-7-6	0	0	90-100	90-100	85-100	70-95	50-76	28-49
	28-80	*Clay	*CH	*A-7-6	0	0	90-100	90-100	85-100	70-95	50-76	25-49
W: Water	0-80	*Water			---	---	---	---	---	---	---	---
WbB: Webb	0-14	*Fine sandy loam	*SC-SM, SM, CL-ML	*A-4, A-2-4	0	0-2	90-100	90-100	85-100	30-65	0-30	NP-10
	14-28	*Sandy clay, Sandy clay loam, clay	*CL, SC	*A-7-6, A-6	0	0-2	95-100	90-100	90-100	49-80	37-50	20-30
	28-80	*Sandy clay loam, Very fine sandy loam, fine sandy loam	*CL, SC,SM, SC-SM	*A-6, A-4	0	0-2	95-100	90-100	90-100	45-80	30-39	12-28
WeB: Weesatche	0-11	*Fine sandy loam	*SM, SC-SM	*A-2-4, A-4	0	0	98-100	95-100	85-98	28-65	20-30	8-15
	11-30	*Sandy clay loam	*SC, CL	*A-6, A-2-6,	0	0	98-100	95-100	85-98	28-75	30-39	15-26
	30-44	*Sandy clay loam, Clay loam	*SC, CL	*A-6, A-2-6	0	0	98-100	95-100	85-99	28-80	25-40	11-24
	44-80	*Sandy clay loam, Loam, clay loam	*CL, SC	*A-6, A-7-6, A-2-6	0	0	98-100	89-100	85-99	34-53	26-40	10-21

Table 25.--Engineering Soil Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
WeC:												
Weesatche-------	0-7	*Fine sandy loam	*SM, SC-SM	*A-2-4, A-4	0	0	98-100	95-100	85-98	28-65	20-30	8-15
	7-21	*Sandy clay loam	*SC, CL	*A-6, A-2-6,	0	0	98-100	95-100	85-98	28-75	30-39	15-26
	21-48	*Sandy clay loam, Clay loam	*SC, CL	*A-6, A-7-6	0	0	98-100	95-100	85-99	28-80	25-40	11-24
	48-80	*Sandy clay loam, Loam, clay loam	*CL, SC	*A-6, A-2-6	0	0	98-100	89-100	85-99	34-53	26-40	10-21
WgC:												
Weigang---------	0-6	*Fine sandy loam	*SM, SC-SM	*A-2-4, A-4,	0	0-4	91-100	77-100	70-100	30-55	27-37	10-13
	6-13	*Sandy clay loam, Loam, clay loam	*CL, CH	*A-6, A-7-6	0	0-4	91-100	77-100	85-95	60-75	32-47	14-23
	13-19	*Sandy clay loam	*CL, SC	*A-6	0	0-5	90-100	85-100	85-95	60-75	34-39	17-25
	19-80	*Bedrock			---	---	---	---	---	---	---	---
WhC:												
Whitsett--------	0-4	*Fine sandy loam	*SM, SC-SM	*A-4	0	0-5	90-100	85-100	75-100	30-60	22-39	6-17
	4-13	*Sandy clay loam	*CL, SC	*A-6	0	0-5	90-100	85-100	80-100	40-75	34-39	17-24
	13-31	*Clay loam, Sandy clay, clay	*CL, CH, SC	*A-7-6,	0	0-5	90-100	85-100	80-100	40-75	40-57	21-32
	31-80	*Bedrock			---	---	---	---	---	---	---	---
WPD:												
Whitsett--------	0-4	*Fine sandy loam	*SM, SC-SM	*A-4	0	0-5	90-100	85-100	75-100	30-60	22-39	6-17
	4-13	*Sandy clay loam	*CL, SC	*A-6	0	0-5	90-100	85-100	80-100	40-75	34-40	17-24
	13-31	*Sandy clay loam, Sandy clay, clay	*CL, SC, CH	*A-6, A-7-6	0	0-5	90-100	85-100	80-100	40-75	40-57	21-32
	31-80	*Bedrock			---	---	---	---	---	---	---	---
Picosa----------	0-8	*Sandy clay loam	*CL, SC	*A-6	0	0-8	75-95	70-95	60-80	51-65	31-39	13-24
	8-80	*Bedrock			---	---	---	---	---	---	---	---
ZaB:												
Zavala, frequently flooded--------	0-11	*Fine sandy loam	*SM, SC-SM, ML, CL-ML	*A-4, A-2-4	0	0	100	95-100	85-98	30-60	16-23	NP-7
	11-80	*Fine sandy loam, Loam	*SM, SC-SM, ML, CL-ML	*A-4, A-2-4	0	0	100	95-100	85-98	30-60	16-23	NP-7
Zavala, occasionally flooded--------	0-11	*Fine sandy loam	*SM, SC-SM, ML, CL-ML	*A-4, A-2-4	0	0	100	95-100	85-98	30-60	16-23	NP-7
	11-80	*Fine sandy loam, Loam	*SM, SC-SM, ML, CL-ML	*A-4, A-2-4	0	0	100	95-100	85-98	30-60	16-23	NP-7

Table 25.--Engineering Soil Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
ZvC:												
Zavco-----------	0-5	*Sandy clay loam	*SC	*A-6 A-6, A-2-4	0	0	95-100	95-100	80-100	30-45	25-40	8-22
	5-27	*Sandy clay, Sandy clay loam, clay, clay loam	*SC	*A-7-6, A-6	0	0	95-100	90-100	80-95	35-45	38-58	18-35
	27-51	*Clay loam, Sandy clay loam	*CL, CH	*A-7-6, A-6	0	0	85-100	80-100	80-100	70-80	35-56	16-32
	51-80	*Clay loam, Sandy clay loam	*CL, CH	*A-7-6, A-6	0	0	85-100	80-100	80-100	70-80	35-56	16-32

Table 26.--Physical Soil Properties

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer. Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
AgB:												
Aguilares------------	0-4	10-20	1.40-1.70	0.6-2	0.11-0.15	0.0-2.9	0.5-2.0	.24	.24	5	4L	86
	4-12	16-30	1.30-1.60	0.6-2	0.06-0.15	3.0-5.9	0.1-2.0	.32	.32			
	12-39	20-35	1.30-1.60	0.6-2	0.05-0.13	3.0-5.9	0.1-1.0	.32	.32			
	39-80	15-32	1.35-1.65	0.6-2	0.03-0.10	3.0-5.9	0.1-1.0	.32	.32			
AlB:												
Alet, occasionally flooded------------	0-4	20-27	1.40-1.65	0.6-2	0.10-0.16	0.0-2.9	1.5-4.0	.10	.10	5	5	56
	4-49	25-35	1.45-1.70	0.6-2	0.14-0.20	0.0-2.9	1.0-3.0	.15	.15			
	49-80	20-35	1.45-1.70	0.6-2	0.10-0.15	0.0-2.9	0.5-1.0	.15	.15			
Alet, frequently flooded------------	0-4	20-27	1.40-1.65	0.6-2	0.10-0.16	0.0-2.9	1.5-4.0	.10	.10	5	5	56
	4-49	25-35	1.45-1.70	0.6-2	0.14-0.20	0.0-2.9	1.0-3.0	.15	.15			
	49-80	20-35	1.45-1.70	0.6-2	0.10-0.15	0.0-2.9	0.5-1.0	.15	.15			
AnC:												
Annarose------------	0-6	12-18	1.30-1.50	2-6	0.10-0.17	0.0-2.9	0.5-2.0	.28	.28	5	3	86
	6-23	15-25	1.20-1.40	0.6-2	0.10-0.17	0.0-2.9	0.5-2.0	.32	.32			
	23-47	8-20	1.50-1.70	0.6-2	0.10-0.17	0.0-2.9	0.0-0.5	.28	.24			
	47-70	---	---	---	---	---	---	---	---			
ANS:												
Area not surveyed---	---	---	---	---	---	---	---	---	---	-	---	---
BeC:												
Benavides-----------	0-9	10-20	1.40-1.70	0.6-2	0.11-0.15	0.0-2.9	1.0-3.0	.24	.24	5	3	86
	9-33	15-30	1.40-1.70	0.6-2	0.11-0.15	0.0-2.9	0.8-1.5	.24	.24			
	33-55	20-35	1.25-1.50	0.6-2	0.12-0.17	0.0-2.9	0.5-1.0	.32	.32			
	55-80	15-30	1.25-1.50	0.6-2	0.12-0.19	0.0-2.9	0.1-0.5	.32	.32			
BkB:												
Bookout-------------	0-16	28-42	1.20-1.40	0.6-2	0.15-0.20	3.0-5.9	0.5-2.0	.32	.32	5	4L	86
	16-80	32-50	1.35-1.55	0.6-2	0.12-0.20	3.0-5.9	0.3-2.0	.28	.28			

Table 26.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
BnB:												
Brennan-------------	0-7	8-18	1.40-1.70	0.1-1	0.11-0.15	0.0-2.9	0.5-1.5	.28	.28	5	3	86
	7-37	20-30	1.40-1.70	0.2-1	0.12-0.17	0.0-2.9	0.1-1.0	.32	.32			
	37-80	20-34	1.40-1.70	0.2-1	0.12-0.17	0.0-2.9	0.1-0.9	.32	.32			
BrB:												
Brundage------------	0-5	10-20	1.40-1.70	0.6-2	0.10-0.15	0.0-2.9	0.5-1.0	.37	.37	2	3	86
	5-13	22-35	1.45-1.75	0.00-0.06	0.05-0.14	3.0-5.9	0.5-1.0	.32	.32			
	13-47	19-35	1.45-1.70	0.06-0.2	0.03-0.14	3.0-5.9	0.5-1.0	.32	.32			
	47-80	20-32	1.35-1.65	0.06-0.2	0.02-0.10	3.0-5.9	0.5-1.0	.32	.32			
BsB:												
Brystal-------------	0-7	7-19	1.40-1.70	0.6-2	0.10-0.15	0.0-2.9	0.1-1.0	.32	.32	5	3	86
	7-33	18-32	1.45-1.70	0.6-2	0.11-0.19	0.0-2.9	0.1-1.0	.24	.24			
	33-80	15-32	1.50-1.75	0.6-2	0.11-0.19	0.0-2.9	0.1-1.0	.24	.24			
BuA:												
Buchel, occasionally flooded------------	0-8	40-60	1.15-1.55	0.00-0.06	0.12-0.20	9.0-25.0	1.0-3.0	.32	.32	5	4	86
	8-42	40-60	1.20-1.60	0.00-0.06	0.12-0.20	9.0-25.0	1.0-3.0	.32	.32			
	42-74	40-60	1.20-1.60	0.00-0.06	0.12-0.20	9.0-25.0	0.1-1.0	.32	.32			
	74-80	40-60	1.15-1.60	0.00-0.06	0.12-0.20	9.0-25.0	0.1-1.0	.32	.32			
BzA:												
Buchel, frequently flooded------------	0-8	40-55	1.00-1.40	0.00-0.06	0.12-0.20	9.0-25.0	2.0-5.0	.32	.32	5	4	86
	8-53	40-60	1.00-1.40	0.00-0.06	0.12-0.20	9.0-25.0	1.0-3.0	.32	.32			
	53-80	40-60	1.00-1.40	0.00-0.06	0.12-0.20	9.0-25.0	0.5-3.0	.32	.32			
CaB:												
Caid----------------	0-10	20-29	1.40-1.65	0.6-2	0.12-0.17	0.0-2.9	1.0-3.0	.24	.24	5	5	56
	10-28	27-35	1.40-1.65	0.6-2	0.12-0.20	3.0-5.9	0.5-2.0	.20	.20			
	28-80	24-35	1.45-1.60	0.6-2	0.12-0.18	3.0-5.9	0.1-1.0	.24	.24			
CbB:												
Campbellton---------	0-5	20-40	1.40-1.65	0.6-2	0.15-0.20	3.0-5.9	1.0-3.0	.32	.32	5	5	56
	5-28	35-60	1.45-1.70	0.2-0.6	0.09-0.18	3.0-5.9	0.5-1.0	.32	.32			
	28-63	15-45	1.35-1.65	0.6-2	0.04-0.14	3.0-5.9	0.5-1.0	.32	.32			
	63-80	---	1.30-1.40	0.00-2	---	---	---	---	---			

Table 26.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
CcB:												
Catarina------------	0-3	35-60	1.20-1.40	0.00-0.06	0.06-0.18	9.0-25.0	1.0-2.0	.32	.32	4	4	86
	3-73	40-60	1.20-1.46	0.00-0.06	0.05-0.09	9.0-25.0	0.5-2.0	.32	.32			
	73-80	35-60	1.28-1.51	0.00-0.06	0.03-0.07	9.0-25.0	0.5-1.0	.32	.32			
ChB:												
Chacon--------------	0-11	15-35	1.45-1.70	0.00-0.1	0.15-0.20	6.0-8.9	0.2-0.7	.32	.32	5	4L	86
	11-44	35-50	1.35-1.60	0.00-0.01	0.12-0.18	6.0-8.9	0.5-1.0	.32	.32			
	44-80	30-50	1.40-1.65	0.03-1	0.15-0.20	6.0-8.9	0.1-0.5	.37	.37			
CkB:												
Choke---------------	0-10	25-40	1.00-1.50	0.6-2	0.15-0.20	3.0-5.9	1.0-4.0	.32	.32	5	4L	86
	10-24	20-35	1.00-1.55	0.6-2	0.15-0.20	3.0-5.9	0.5-2.0	.32	.32			
	24-34	20-35	1.00-1.55	0.6-2	0.15-0.20	3.0-5.9	0.5-1.0	.32	.32			
	34-48	20-35	1.00-1.55	0.6-2	0.15-0.20	3.0-5.9	0.3-0.8	.32	.32			
	48-73	15-26	1.10-1.55	0.6-2	0.15-0.20	1.0-5.0	0.0-0.5	.32	.32			
	73-80	15-25	1.20-1.60	0.6-2	0.10-0.18	1.0-3.0	0.0-0.5	.32	.32			
ClA:												
Cochina, occasionally flooded------------	0-4	45-70	1.25-1.45	0.00-0.06	0.08-0.13	9.0-25.0	1.0-3.0	.32	.32	5	4	86
	4-33	55-80	1.25-1.45	0.00-0.06	0.08-0.13	9.0-25.0	0.5-2.0	.32	.32			
	33-80	55-80	1.25-1.45	0.00-0.06	0.08-0.13	9.0-25.0	0.5-1.0	.32	.32			
CmA:												
Cochina, frequently flooded------------	0-4	45-70	1.25-1.45	0.00-0.06	0.08-0.13	9.0-25.0	1.0-3.0	.32	.32	5	4	86
	4-33	55-80	1.25-1.45	0.00-0.06	0.08-0.13	9.0-25.0	0.5-2.0	.32	.32			
	33-80	55-80	1.25-1.45	0.00-0.06	0.08-0.13	9.0-25.0	0.5-1.0	.32	.32			
CnB:												
Colmena-------------	0-9	12-24	1.30-1.55	2-6	0.11-0.16	0.0-2.9	1.0-6.0	.15	.15	5	3	86
	9-29	20-30	1.30-1.60	1-3	0.14-0.20	3.0-5.9	1.0-2.0	.20	.20			
	29-40	22-35	1.30-1.60	0.6-2	0.14-0.20	3.0-5.9	0.1-0.5	.20	.20			
	40-80	19-35	1.45-1.70	0.6-2	0.10-0.17	3.0-5.9	0.1-1.0	.20	.20			
CoB:												
Conquista-----------	0-19	40-55	1.40-1.60	0.00-0.06	0.14-0.20	6.0-8.9	1.0-3.0	.32	.32	2	4	86
	19-80	27-55	1.20-1.50	0.00-0.06	0.14-0.20	6.0-8.9	0.5-2.0	.28	.28			

Table 26.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
CpC:												
Copita	0-9	14-25	1.35-1.60	2-6	0.10-0.15	0.0-2.9	0.5-1.0	.20	.20	3	5	56
	13-35	18-35	1.30-1.55	0.6-2	0.06-0.15	0.0-2.9	0.5-1.0	.24	.24			
	35-80	---	1.20-1.35	0.2-0.6	---	---	---	---	---			
CtA:												
Coquat, frequently flooded	0-5	45-60	1.20-1.45	0.00-0.06	0.12-0.16	9.0-25.0	1.0-3.0	.32	.32	5	4	86
	5-36	45-60	1.25-1.50	0.00-0.06	0.08-0.12	9.0-25.0	0.5-1.0	.32	.32			
	36-74	45-60	1.30-1.50	0.00-0.06	0.04-0.10	9.0-25.0	0.5-1.0	.32	.32			
CuB:												
Cotulla	0-4	30-60	1.20-1.35	0.00-0.06	0.10-0.17	9.0-25.0	1.0-3.0	.32	.32	5	4L	86
	4-60	40-60	1.20-1.35	0.00-0.06	0.05-0.12	9.0-25.0	0.5-2.0	.32	.32			
	60-80	35-60	1.45-1.70	0.00-0.06	0.06-0.13	6.0-8.9	0.1-0.5	.24	.24			
CVB:												
Cotulla	0-4	30-60	1.20-1.35	0.00-0.06	0.10-0.17	9.0-25.0	1.0-3.0	.32	.32	5	4L	86
	4-60	40-60	1.20-1.35	0.00-0.06	0.05-0.12	9.0-25.0	0.5-2.0	.32	.32			
	60-80	35-60	1.45-1.70	0.00-0.06	0.06-0.13	6.0-8.9	0.1-0.5	.24	.24			
Maverick	0-15	35-50	1.35-1.55	0.06-0.2	0.12-0.18	6.0-8.9	0.5-1.0	.32	.32	3	4	86
	15-33	30-50	1.35-1.60	0.06-0.2	0.06-0.15	6.0-8.9	0.5-1.0	.32	.32			
	33-38	27-55	1.35-1.60	0.06-0.2	0.03-0.09	6.0-8.9	0.5-1.0	.32	.32			
	38-80	45-60	1.40-1.70	0.00-0.06	0.01-0.09	6.0-8.9	0.5-1.0	.32	.32			
CyB:												
Coy	0-8	27-50	1.35-1.55	0.2-0.6	0.15-0.20	3.0-5.9	1.0-3.0	.32	.32	5	4	86
	8-48	35-62	1.35-1.38	0.00-0.06	0.14-0.18	6.0-8.9	0.5-2.0	.24	.24			
	48-80	40-55	1.35-1.38	0.00-0.06	0.10-0.18	6.0-8.9	0.5-1.0	.28	.28			
CZB:												
Czar	0-5	20-30	1.10-1.55	0.6-2	0.12-0.20	3.0-5.9	1.0-3.0	.32	.32	5	6	56
	5-22	25-35	1.20-1.60	0.6-2	0.15-0.20	3.0-8.9	0.5-2.0	.32	.32			
	22-80	25-35	1.40-1.60	0.6-2	0.12-0.16	3.0-5.9	0.5-1.5	.32	.32			
Clareville, rarely flooded	0-12	25-35	1.35-1.55	0.6-2	0.12-0.20	3.0-5.9	1.0-3.0	.32	.32	5	5	56
	12-41	35-45	1.35-1.55	0.2-0.6	0.15-0.20	6.0-8.9	1.0-3.0	.32	.32			
	41-80	30-45	1.40-1.60	0.2-0.6	0.15-0.20	6.0-8.9	0.5-2.0	.32	.32			

Table 26.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
DAM:												
Dams	---	---	---	---	---	---	---	---	---	-	---	---
DsB:												
Dosrios	0-8	35-55	1.20-1.45	0.00-0.06	0.13-0.18	9.0-25.0	1.0-4.0	.28	.28	5	4	86
	8-30	35-60	1.20-1.55	0.00-0.06	0.13-0.18	9.0-25.0	0.5-3.0	.24	.24			
	30-54	35-60	1.30-1.60	0.00-0.06	0.13-0.17	9.0-25.0	0.5-1.0	.24	.24			
	54-70	35-60	1.45-1.70	0.00-0.06	0.06-0.13	6.0-8.9	0.1-0.5	.24	.24			
	70-80	35-60	1.45-1.70	0.00-0.06	0.00-0.02	6.0-8.9	0.1-0.5	.24	.24			
EsB:												
Eloso	0-9	40-59	1.15-1.50	0.00-0.06	0.14-0.20	6.0-8.9	1.0-3.0	.28	.28	3	4	86
	9-37	40-55	1.20-1.50	0.00-0.06	0.14-0.20	6.0-8.9	0.5-2.0	.28	.28			
	37-80	---	1.20-1.35	0.00-0.2	---	---	---	---	---			
EvC:												
Esseville	0-10	40-60	1.05-1.35	0.00-0.03	0.12-0.20	9.0-25.0	1.0-4.0	.32	.32	3	4	86
	10-24	45-60	1.10-1.45	0.00-0.03	0.07-0.18	9.0-25.0	1.0-4.0	.32	.32			
	24-34	55-75	1.05-1.45	0.00-0.03	0.07-0.18	9.0-25.0	0.5-2.0	.32	.32			
	34-80	55-80	1.00-1.35	0.00-0.06	0.05-0.17	9.0-25.0	0.1-0.5	.32	.32			
FaC:												
Fashing	0-7	35-50	1.30-1.45	0.06-0.2	0.10-0.18	6.0-8.9	1.0-2.0	.32	.32	2	4	86
	7-12	38-52	1.70-1.90	0.06-0.6	0.02-0.06	0.0-2.9	0.5-2.0	.37	.37			
	12-80	55-80	1.00-1.35	0.00-0.06	0.05-0.17	6.0-8.9	0.1-0.5	---	---			
FoB:												
Floresville, eroded	0-11	8-20	1.45-1.60	0.6-2	0.10-0.15	0.0-2.9	0.1-1.0	.28	.28	5	3	86
	11-31	35-50	1.40-1.60	0.06-0.2	0.14-0.18	3.0-5.9	0.1-1.0	.28	.28			
	31-80	30-45	1.45-1.60	0.2-0.6	0.10-0.16	3.0-5.9	0.1-1.0	.28	.28			
HnC:												
Hindes	0-4	18-35	1.40-1.65	0.6-2	0.06-0.13	0.0-2.9	1.0-3.0	.10	.32	4	8	0
	4-12	35-55	1.25-1.45	0.2-0.6	0.02-0.13	0.0-2.9	0.5-3.0	.10	.32			
	12-80	18-40	1.40-1.70	0.6-2	0.02-0.09	0.0-2.9	0.5-1.0	.10	.32			
HoB:												
Houla	0-7	25-39	1.35-1.55	0.6-2	0.15-0.20	3.0-5.9	1.0-3.0	.28	.28	5	4L	86
	7-15	25-38	1.40-1.60	0.6-2	0.15-0.20	3.0-5.9	1.0-3.0	.28	.28			
	15-58	15-30	1.50-1.70	2-6	0.15-0.20	3.0-5.9	0.4-1.0	.24	.24			
	58-80	9-20	1.50-1.70	2-6	0.10-0.16	0.0-2.9	0.1-0.3	.32	.32			

Table 26.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
ImB:												
Imogene, occasionally flooded------------	0-4	10-18	1.40-1.70	1-14	0.10-0.20	0.0-2.9	1.0-3.0	.37	.37	2	3	86
	4-13	20-40	1.50-1.75	0.00-0.1	0.15-0.20	3.0-5.9	0.5-2.0	.24	.24			
	13-53	20-34	1.40-1.65	0.01-0.1	0.15-0.20	3.0-5.9	0.5-1.0	.32	.32			
	53-80	15-34	1.40-1.65	0.01-0.1	0.00-0.20	3.0-5.9	0.5-1.0	.28	.28			
LaB:												
Laparita, rarely flooded------------	0-4	30-39	1.40-1.70	0.00-0.1	0.15-0.20	3.0-5.9	1.0-3.0	.32	.32	5	5	56
	4-31	30-58	1.32-1.38	0.00-0.1	0.14-0.16	6.0-8.9	0.5-3.0	.32	.32			
	31-60	22-58	1.35-1.65	0.00-0.1	0.13-0.17	6.0-8.9	0.5-1.0	.32	.32			
	60-80	22-58	1.20-1.35	0.00-1	0.10-0.15	0.0-2.9	0.0-0.5	.37	.37			
LeB:												
Lasalle-------------	0-5	40-60	1.30-1.38	0.00-0.06	0.10-0.17	9.0-25.0	1.0-3.0	.32	.32	5	4	86
	5-24	40-60	1.32-1.38	0.00-0.06	0.06-0.12	9.0-25.0	0.5-3.0	.32	.32			
	24-80	40-60	1.25-1.50	0.00-0.06	0.02-0.10	9.0-25.0	0.5-2.0	.32	.32			
LnB:												
Leoncita------------	0-11	15-20	1.40-1.70	0.6-2	0.11-0.15	0.0-2.9	1.0-3.0	.24	.24	5	3	86
	11-41	23-31	1.20-1.45	0.6-2	0.12-0.17	3.0-5.9	0.5-1.0	.32	.32			
	41-80	23-35	1.25-1.45	0.6-2	0.12-0.20	3.0-5.9	0.1-0.5	.32	.32			
LoC:												
Lomart--------------	0-8	12-25	1.35-1.55	0.6-2	0.15-0.24	0.0-2.9	0.4-1.0	.28	.28	3	4L	86
	8-24	8-16	1.40-1.65	2-6	0.05-0.15	0.0-2.9	0.2-0.6	.32	.32			
	24-80	---	---	0.2-2	---	---	---	---	---			
MaD:												
Mata----------------	0-14	27-35	1.35-1.60	0.6-2	0.08-0.12	0.0-2.9	1.0-4.0	.32	.32	4	5	56
	14-31	27-40	1.25-1.50	0.6-2	0.08-0.12	0.0-2.9	0.5-2.0	.32	.32			
	31-43	27-40	1.40-1.70	0.06-0.2	0.09-0.12	6.0-8.9	0.5-1.0	.37	.37			
	43-80	35-60	1.45-1.70	0.00-0.06	0.06-0.13	6.0-8.9	0.1-0.5	.24	.24			
McC:												
Maverick------------	0-15	35-50	1.35-1.55	0.06-0.2	0.12-0.18	6.0-8.9	0.5-1.0	.32	.32	3	4	86
	15-33	40-50	1.35-1.60	0.06-0.2	0.06-0.15	6.0-8.9	0.5-1.0	.32	.32			
	33-38	40-55	1.35-1.60	0.06-0.2	0.03-0.09	6.0-8.9	0.5-1.0	.32	.32			
	38-80	45-60	1.40-1.70	0.00-0.06	0.01-0.09	6.0-8.9	0.5-1.0	.32	.32			

Table 26.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
MgD:												
Mirasol	0-6	10-20	1.50-1.65	0.6-2	0.06-0.14	0.0-2.9	0.5-1.0	.15	.28	2	8	0
	6-16	10-25	1.50-1.65	0.6-2	0.07-0.12	0.0-2.9	0.1-0.5	.10	.28			
	16-19	---	---	0.00-0.06	---	---	---	---	---			
	19-80	---	---	0.00-0.06	---	---	---	---	---			
MoC:												
Moglia	0-6	27-40	1.35-1.60	0.6-2	0.12-0.15	3.0-5.9	1.0-3.0	.32	.32	5	4L	56
	6-30	30-43	1.28-1.50	0.2-0.6	0.02-0.10	3.0-5.9	0.5-2.0	.32	.32			
	30-80	15-30	1.35-1.65	0.6-2	0.07-0.16	3.0-5.9	0.5-1.0	.32	.32			
MtB:												
Montell	0-17	40-55	1.30-1.45	0.00-0.06	0.12-0.19	9.0-25.0	1.0-4.0	.32	.32	5	4	86
	17-39	40-60	1.30-1.45	0.00-0.06	0.11-0.18	9.0-25.0	1.0-2.0	.32	.32			
	39-80	40-60	1.30-1.45	0.00-0.06	0.09-0.15	9.0-25.0	0.1-0.5	.32	.32			
MwA:												
Monwebb, occasionally flooded	0-15	39-55	1.30-1.45	0.00-0.06	0.12-0.19	9.0-25.0	1.0-4.0	.32	.32	5	4	86
	15-40	40-60	1.30-1.45	0.00-0.06	0.11-0.18	9.0-25.0	1.0-2.0	.32	.32			
	40-80	40-60	1.30-1.45	0.00-0.06	0.09-0.15	9.0-25.0	0.1-0.5	.32	.32			
OmD:												
Olmedo	0-6	12-21	1.25-1.55	0.6-2	0.05-0.10	0.0-2.9	1.0-5.0	.10	.32	1	8	0
	6-12	12-21	1.30-1.55	0.6-2	0.05-0.10	0.0-2.9	1.0-3.0	.10	.32			
	12-38	---	---	0.00-0.06	---	---	---	---	---			
	38-80	---	---	0.00-0.2	---	---	---	---	---			
PIT:												
Pits	0-80	---	---	0.06-20	0.01-0.10	0.0-2.9	---	.10	---	-	8	0
PkC:												
Pavelek, severely eroded	0-4	35-50	1.10-1.47	0.06-0.2	0.14-0.20	6.0-8.9	1.0-3.0	.37	.37	1	4	86
	4-11	35-55	1.10-1.47	0.06-0.2	0.12-0.18	3.0-5.9	1.0-3.0	.15	.37			
	11-14	---	---	0.06-0.2	0.00-0.00	---	---	.10	.10			
	14-80	14-26	1.20-1.35	0.6-2	0.02-0.05	0.0-2.9	0.0-0.5	.37	.37			

Table 26.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
PrC:												
Pernitas------------	0-16	15-20	1.35-1.60	2-6	0.11-0.16	0.0-2.9	1.0-3.0	.28	.28	5	3	86
	7-35	21-35	1.30-1.55	0.6-2	0.13-0.18	3.0-5.9	0.1-2.0	.32	.32			
	16-38	22-40	1.35-1.60	0.6-2	0.13-0.19	3.0-5.9	0.1-2.0	.32	.32			
	38-80	18-30	1.35-1.60	0.6-2	0.10-0.15	3.0-5.9	0.1-1.0	.32	.32			
PtC:												
Pernitas------------	0-7	20-32	1.35-1.60	0.6-2	0.11-0.16	0.0-2.9	1.0-3.0	.32	.32	5	3	86
	7-16	21-35	1.30-1.55	0.6-2	0.13-0.18	3.0-5.9	0.1-2.0	.32	.32			
	16-38	25-40	1.35-1.60	0.6-2	0.13-0.19	3.0-5.9	0.1-2.0	.28	.32			
	38-80	21-35	1.35-1.60	0.6-2	0.10-0.15	3.0-5.9	0.1-1.0	.20	.20			
RNB:												
Rhymes--------------	0-6	1-10	1.35-1.50	6-20	0.05-0.08	0.0-2.9	0.5-1.0	.17	.17	5	1	250
	6-43	1-13	1.35-1.50	2-20	0.05-0.11	0.0-2.9	0.1-1.0	.17	.17			
	43-80	18-35	1.50-1.65	0.2-0.6	0.12-0.17	3.0-5.9	0.1-1.0	.24	.24			
Nusil---------------	0-9	1-10	1.35-1.50	6-20	0.05-0.08	0.0-2.9	0.5-1.0	.17	.17	5	1	250
	9-25	1-13	1.35-1.65	2-20	0.05-0.11	0.0-2.9	0.1-1.0	.17	.17			
	25-43	18-35	1.60-1.70	0.2-0.6	0.08-0.12	3.0-5.9	0.1-1.0	.24	.24			
	72-80	15-30	1.50-1.65	0.6-2	0.11-0.17	3.0-5.9	0.5-1.0	.24	.24			
RoB:												
Rosenbrock----------	0-6	40-50	1.10-1.35	0.00-0.06	0.14-0.20	6.0-8.9	2.0-5.0	.24	.24	4	4	86
	6-44	45-60	1.10-1.35	0.00-0.06	0.14-0.20	6.0-8.9	1.0-3.0	.24	.24			
	44-56	40-50	1.10-1.35	0.00-0.06	0.14-0.20	6.0-8.9	1.0-2.0	.24	.24			
	56-63	30-40	1.10-1.35	0.2-0.6	0.13-0.19	2.9-6.0	0.3-1.0	.28	.28			
	63-80	10-26	1.10-1.35	0.6-2	0.07-0.11	0.0-2.9	0.1-0.3	.37	.37			
SaB:												
Salco---------------	0-10	12-20	1.45-1.60	0.6-2	0.12-0.17	3.0-5.9	1.0-3.0	.24	.28	5	3	86
	10-20	27-35	1.25-1.50	0.6-2	0.12-0.17	3.0-5.9	0.5-1.3	.32	.32			
	20-45	20-35	1.25-1.50	0.6-2	0.12-0.17	3.0-5.9	0.3-1.0	.32	.32			
	45-80	5-21	1.35-1.55	0.6-2	0.15-0.20	3.0-5.9	0.1-0.5	.32	.32			
ScD:												
Sancajo-------------	0-6	12-34	1.35-1.60	0.6-2	0.05-0.10	0.0-2.9	1.0-3.0	.10	.32	1	8	0
	6-11	12-34	1.35-1.60	0.6-2	0.05-0.10	0.0-2.9	0.8-1.3	.10	.10			
	11-18	---	---	0.00-0.01	---	---	---	.10	.10			
	18-38	14-26	1.20-1.35	0.6-2	0.02-0.05	0.0-2.9	0.1-0.5	.37	.37			
	38-80	---	1.20-1.35	0.00-0.2	---	---	---	---	---			

Table 26.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
SrC:												
Sarnosa	0-15	8-18	1.35-1.55	0.6-2	0.10-0.15	0.0-2.9	1.0-3.0	.24	.24	5	3	86
	15-30	10-25	1.40-1.60	0.6-2	0.10-0.15	0.0-2.9	0.5-2.0	.24	.24			
	30-51	10-25	1.40-1.65	2-6	0.06-0.12	0.0-2.9	0.1-1.0	.24	.24			
	51-80	10-25	1.40-1.65	2-6	0.06-0.12	0.0-2.9	0.1-0.8	.24	.24			
StB:												
Sinton, frequently flooded	0-9	10-35	1.30-1.65	0.03-1	0.12-0.17	0.0-2.9	0.5-2.0	.28	.28	5	5	56
	9-80	20-35	1.40-1.70	0.03-1	0.12-0.17	0.0-2.9	1.0-3.0	.28	.28			
TaB:												
Tela, occasionally flooded	0-8	16-28	1.40-1.65	0.6-2	0.10-0.16	0.0-2.9	1.0-4.0	.28	.28	5	6	56
	8-16	18-35	1.45-1.70	0.6-2	0.14-0.20	0.0-2.9	0.5-4.0	.32	.32			
	16-80	16-30	1.45-1.70	0.6-2	0.14-0.20	0.0-2.9	0.1-1.0	.32	.32			
Tela, frequently flooded	0-8	16-28	1.40-1.65	0.6-2	0.10-0.16	0.0-2.9	1.0-4.0	.28	.28	5	6	56
	8-16	18-35	1.45-1.70	0.6-2	0.14-0.20	0.0-2.9	0.5-4.0	.32	.32			
	16-80	16-30	1.45-1.70	0.6-2	0.14-0.20	0.0-2.9	0.1-1.0	.32	.32			
ToB:												
Tordia	0-7	32-50	1.25-1.45	0.00-0.06	0.12-0.18	6.0-8.9	1.0-4.0	.32	.32	4	4	86
	7-20	40-60	1.25-1.45	0.00-0.06	0.12-0.18	6.0-8.9	0.5-1.0	.32	.32			
	20-39	40-60	1.25-1.45	0.00-0.06	0.12-0.18	6.0-8.9	0.1-0.5	.32	.32			
	39-53	40-60	1.45-1.65	0.00-0.06	0.10-0.15	3.0-5.9	0.1-0.5	.32	.32			
	53-80	35-60	1.45-1.70	0.00-0.06	0.06-0.13	6.0-8.9	0.1-0.5	.24	.24			
VeC:												
Verick	0-2	12-18	1.45-1.65	1-14	0.11-0.15	0.0-2.9	0.5-1.0	.24	.24	2	3	86
	2-8	15-30	1.40-1.70	0.1-1	0.11-0.15	0.0-2.9	0.5-1.0	.24	.24			
	8-80	---	---	0.2-2	---	---	---	---	---			
VrC:												
Viboras	0-6	35-60	1.32-1.38	0.00-0.06	0.08-0.14	6.0-8.9	0.5-1.0	.32	.32	3	4	86
	6-28	40-60	1.32-1.38	0.00-0.06	0.02-0.14	6.0-8.9	0.5-1.0	.32	.32			
	28-80	40-60	1.32-1.38	0.00-0.06	0.02-0.05	6.0-8.9	0.1-0.8	.32	.32			
W:												
Water	0-31	---	---	---	---	---	---	---	---	-	---	---

Table 26.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
WbB:												
Webb-----------------	0-14	8-20	1.40-1.60	0.6-2	0.12-0.17	0.0-2.9	1.0-2.0	.37	.37	5	3	86
	14-28	30-45	1.40-1.60	0.2-0.6	0.15-0.20	3.0-5.9	0.5-1.0	.32	.32			
	28-80	18-35	1.30-1.60	0.6-2	0.10-0.18	3.0-5.9	0.5-1.0	.32	.32			
WeB:												
Weesatche-----------	0-7	10-25	1.35-1.55	0.6-2	0.11-0.15	0.0-2.9	1.0-4.0	.32	.32	5	3	86
	7-21	18-35	1.30-1.50	0.6-2	0.15-0.20	3.0-5.9	0.5-4.0	.32	.32			
	21-48	18-35	1.30-1.55	0.6-2	0.10-0.15	3.0-5.9	0.1-1.0	.32	.32			
	44-80	15-30	1.30-1.55	0.6-2	0.10-0.15	3.0-5.9	0.1-1.0	.15	.15			
WeC:												
Weesatche-----------	0-7	10-25	1.35-1.55	0.6-2	0.11-0.15	0.0-2.9	1.0-4.0	.32	.32	5	3	86
	7-21	18-35	1.30-1.50	0.6-2	0.15-0.20	3.0-5.9	0.5-4.0	.32	.32			
	21-48	18-35	1.30-1.55	0.6-2	0.10-0.15	3.0-5.9	0.1-1.0	.32	.32			
	48-80	15-30	1.30-1.55	0.6-2	0.10-0.15	3.0-5.9	0.1-1.0	.15	.15			
WgC:												
Weigang-------------	0-6	16-20	1.50-1.70	0.1-1	0.11-0.15	0.0-2.9	1.0-3.0	.24	.24	2	3	86
	6-13	21-32	1.40-1.70	0.01-0.1	0.12-0.20	3.0-5.9	0.5-2.0	.28	.32			
	13-19	25-35	1.60-1.65	0.01-0.1	0.12-0.17	0.0-2.9	0.5-1.0	.20	.20			
	19-80	---	---	---	---	---	---	---	---			
WhC:												
Whitsett------------	0-4	10-25	1.50-1.70	2-6	0.11-0.15	0.0-2.9	1.0-3.0	.28	.28	3	3	86
	4-13	25-35	1.40-1.70	0.6-2	0.09-0.20	0.0-2.9	0.5-2.0	.32	.32			
	13-31	30-45	1.40-1.70	0.06-0.2	0.09-0.15	3.0-5.9	0.5-1.8	.32	.32			
	31-41	---	---	---	---	---	---	---	---			
WPD:												
Whitsett------------	0-4	10-25	1.50-1.70	2-6	0.11-0.15	0.0-2.9	1.0-3.0	.28	.28	3	3	86
	4-13	25-35	1.40-1.70	0.6-2	0.09-0.20	0.0-2.9	0.5-2.0	.32	.32			
	13-31	30-45	1.40-1.70	0.06-0.2	0.09-0.15	3.0-5.9	0.5-1.8	.32	.32			
	31-41	---	---	---	---	---	---	---	---			
Picosa--------------	0-19	20-35	1.30-1.45	0.6-2	0.06-0.15	0.0-2.9	1.0-3.0	.10	.15	1	6	48
	19-80	---	---	0.2-2	---	---	---	---	---			

Table 26.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility (Ksat)	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors			Wind erodi-bility group	Wind erodi-bility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
ZaB:												
Zavala, frequently flooded------------	0-11	5-18	1.40-1.70	2-6	0.11-0.16	0.0-2.9	1.0-2.0	.28	.28	5	3	86
	11-80	5-18	1.40-1.70	2-6	0.11-0.16	0.0-2.9	0.5-2.0	.28	.28			
Zavala, occasionally flooded------------	0-11	5-18	1.40-1.70	2-6	0.11-0.16	0.0-2.9	1.0-2.0	.28	.28	5	3	86
	11-80	5-18	1.40-1.70	2-6	0.11-0.16	0.0-2.9	0.5-2.0	.28	.28			
ZvC:												
Zavco----------------	0-5	20-32	1.60-1.65	0.6-2	0.12-0.20	0.0-2.9	1.0-4.0	.17	.17	5	5	56
	5-27	30-45	1.32-1.38	0.2-0.6	0.12-0.18	3.0-5.9	0.5-4.0	.20	.20			
	27-51	24-45	1.30-1.60	0.6-2	0.06-0.15	3.0-5.9	0.5-1.0	.20	.28			
	51-80	24-45	1.30-1.60	0.6-2	0.06-0.15	3.0-5.9	0.5-1.0	.20	.28			

Table 27.--Chemical Soil Properties

(Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	Cation exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	Inches	meq/100 g	pH	Pct	Pct	dS/m	
AgB:							
Aguilares	0-4	3.0-10	7.9-8.4	0-20	0	0.0-2.0	0
	4-12	6.0-18	7.9-8.4	10-35	0	0.0-2.0	0
	12-39	8.0-18	7.9-8.4	10-35	0-4	4.0-16.0	8-30
	39-80	3.0-18	7.9-8.4	10-35	0-20	8.0-16.0	8-30
AlB:							
Alet, occasionally flooded	0-4	17-23	6.6-8.4	0-5	0-1	0.0-2.0	0-2
	4-49	20-29	7.4-8.4	0-5	0-1	0.0-2.0	0-4
	49-80	16-28	7.4-8.4	5-15	0-1	0.0-2.0	2-10
Alet, frequently flooded	0-4	17-23	6.6-8.4	0-5	0-1	0.0-2.0	0-2
	4-49	20-29	7.4-8.4	0-5	0-1	0.0-2.0	0-4
	49-80	16-28	7.4-8.4	5-15	0-1	0.0-2.0	2-10
AnC:							
Annarose	0-6	9.2-16	7.4-8.4	10-25	0	0.0-1.0	0
	6-23	2.3-21	7.9-8.4	20-35	0	0.0-1.0	0
	23-47	6.1-16	7.9-8.4	15-30	0	0.0-1.0	0
	47-70	---	---	---	---	---	---
ANS:							
Area not surveyed	---	---	---	---	---	---	---
BeC:							
Benavides	0-9	7.0-10	7.9-8.4	1-10	0	0	0
	9-33	7.0-10	7.9-8.4	6-20	0	0	0
	33-55	15-25	7.9-8.4	10-50	0	0.0-2.0	0
	55-80	15-20	7.9-8.4	15-40	0	0.0-4.0	0-2
BkB:							
Bookout	0-16	7.0-18	7.4-8.4	4-25	0	0.0-2.0	0
	16-80	8.0-18	7.4-8.4	10-50	0	0.0-2.0	0
BnB:							
Brennan	0-7	10-20	6.6-7.8	0-2	0	0.0-2.0	0
	7-37	15-25	7.4-8.4	2-30	0-2	0.0-4.0	0
	37-80	10-20	7.4-8.4	2-30	0-10	0.0-4.0	0-20
BrB:							
Brundage	0-5	3.0-10	5.6-7.3	0	0	0.0-4.0	0-12
	5-13	6.0-18	5.6-7.8	0	0	2.0-16.0	5-40
	13-47	6.0-18	7.4-8.4	0-20	0-5	8.0-16.0	5-45
	47-80	10-16	7.9-8.4	5-20	0-5	8.0-20.0	5-50
BsB:							
Brystal	0-7	3.7-10	6.6-7.8	0	0	0.0-2.0	0-2
	7-33	9.3-17	6.6-8.4	0-15	0	0.0-2.0	0-8
	33-80	7.8-17	7.4-8.4	2-35	0	0.0-6.0	0-12
BuA:							
Buchel, occasionally flooded	0-8	30-50	7.4-8.4	20-30	0	0.0-4.0	0-2
	8-42	30-50	7.4-8.4	5-15	0	0.0-4.0	0-10
	42-74	30-50	7.4-8.4	5-15	0	0.0-4.0	0-10
	74-80	30-50	7.4-8.4	5-15	0	0.0-8.0	5-15

Table 27.--Chemical Soil Properties--Continued

Map symbol and soil name	Depth	Cation exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	Inches	meq/100 g	pH	Pct	Pct	dS/m	
BzA:							
Buchel, frequently flooded	0-8	31-39	7.9-8.4	2-20	0	0.0-4.0	0-2
	8-53	30-42	7.9-8.4	2-20	0	0.0-4.0	0-10
	53-80	29-40	7.9-8.4	10-30	0-2	0.0-8.0	5-15
CaB:							
Caid	0-10	11-16	7.4-8.4	2-15	0	0	0
	10-28	14-19	7.4-8.4	5-25	0	0	0
	28-80	12-19	7.4-8.4	15-35	0	0.0-2.0	0-4
CbB:							
Campbellton	0-5	15-25	7.4-8.4	2-15	0	0.0-2.0	0
	5-28	20-35	7.4-8.4	10-25	0-5	2.0-8.0	17-57
	28-63	15-25	7.4-8.4	2-25	0-10	4.0-16.0	17-56
	63-80	---	---	---	---	---	---
CcB:							
Catarina	0-3	22-40	7.4-8.4	2-15	0-5	0.0-8.0	0-30
	3-73	22-40	7.4-8.4	2-20	0-15	4.0-16.0	13-35
	73-80	22-40	7.4-8.4	2-20	0-15	8.0-16.0	13-35
ChB:							
Chacon	0-11	12-27	7.9-8.4	5-15	0	0.0-1.0	0
	11-44	17-35	7.9-8.4	5-20	0	0.0-8.0	0-12
	44-80	15-35	7.9-8.4	9-20	0-25	4.0-16.0	5-30
CkB:							
Choke	0-10	25-40	7.9-8.4	5-15	0	0.0-2.0	0
	10-24	25-40	7.9-8.4	10-15	0	0.0-2.0	0
	24-34	25-40	7.9-8.4	15-30	0	0.0-2.0	0-2
	34-48	20-40	7.9-8.4	15-30	0	0.0-2.0	0-2
	48-73	20-35	7.9-8.4	15-30	0	2.0-8.0	2-8
	73-80	20-35	7.4-8.4	10-20	0	4.0-16.0	2-8
ClA:							
Cochina, occasionally flooded	0-4	25-56	7.4-8.4	2-15	0	0.0-4.0	0-35
	4-33	25-56	7.4-8.4	2-20	0-5	2.0-15.0	2-35
	33-80	27-56	7.4-8.4	2-20	0-5	4.0-15.0	5-45
CmA:							
Cochina, frequently flooded	0-4	25-56	7.4-8.4	2-15	0	0.0-4.0	0-35
	4-33	25-56	7.4-8.4	2-20	0-5	2.0-15.0	2-35
	33-80	27-56	7.4-8.4	2-20	0-5	4.0-10.0	5-45
CnB:							
Colmena	0-9	11-21	6.1-7.8	0	0	0.0-2.0	0
	9-29	17-25	6.6-8.4	0-2	0	0.0-2.0	0-2
	29-40	16-27	7.4-8.4	3-20	0	0.0-2.0	0-4
	40-80	15-28	7.4-8.4	5-15	0	0.0-4.0	0-10
CoB:							
Conquista	0-19	35-45	7.4-8.4	0-11	0	0.0-2.0	0
	19-80	30-40	7.4-8.4	0-15	0	0.0-1.0	0-2

Table 27.--Chemical Soil Properties--Continued

Map symbol and soil name	Depth	Cation exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	Inches	meq/100 g	pH	Pct	Pct	dS/m	
CpC:							
Copita	0-9	7.5-13	7.9-8.4	1-10	0	0.0-4.0	0
	13-35	9.6-19	7.9-8.4	10-35	0-2	2.0-8.0	0-12
	35-80	---	---	---	---	---	---
CtA:							
Coquat, frequently flooded	0-5	22-42	7.4-8.4	0-5	0	0.0-4.0	0-13
	5-36	22-42	7.4-8.4	5-15	0	0.0-4.0	0-35
	36-74	22-42	7.4-8.4	5-15	0-5	4.0-16.0	13-50
CuB:							
Cotulla	0-4	30-50	7.4-8.4	2-15	0-2	0.0-4.0	0-10
	4-60	30-50	7.4-8.4	2-20	0-10	4.0-16.0	5-40
	60-80	16-37	7.4-9.0	0-15	2-5	4.0-16.0	10-35
CVB:							
Cotulla	0-4	30-50	7.4-8.4	2-15	0-2	0.0-4.0	0-35
	4-60	30-50	7.4-8.4	2-20	0-10	4.0-16.0	5-40
	60-80	16-37	7.4-9.0	0-15	2-5	4.0-16.0	10-35
Maverick	0-15	21-37	7.4-9.0	5-15	0	2.0-4.0	13-16
	15-33	24-37	7.4-8.4	5-15	0-5	7.0-15.0	13-16
	33-38	13-30	7.4-8.4	10-25	0-10	8.0-16.0	13-16
	38-80	16-35	7.4-8.4	5-15	0-15	8.0-16.0	13-16
CyB:							
Coy	0-8	22-38	7.9-8.4	0-2	0	0.0-2.0	0-5
	8-48	26-45	7.9-8.4	0-10	0-5	0.0-2.0	2-15
	48-80	15-35	7.9-8.4	2-20	0-10	2.0-8.0	4-25
CZB:							
Czar	0-5	20-35	6.6-7.8	0-5	0	0.0-1.0	0
	5-22	20-50	7.9-8.4	0-5	0	0.0-1.0	0
	22-80	15-50	7.9-8.4	5-15	0	0.0-1.0	0-2
Clareville, rarely flooded	0-12	20-28	6.6-7.8	0-2	0	0.0-1.0	0
	12-41	27-35	6.6-7.8	0-2	0	0.0-2.0	0
	41-80	23-34	7.9-8.4	5-30	0	0.0-6.0	0-20
DAM:							
Dams	---	---	---	---	---	---	---
DsB:							
Dosrios	0-8	27-41	7.4-8.4	0-10	0	0.0-4.0	0-5
	8-30	26-44	7.4-8.4	0-10	0-3	2.0-4.0	14-25
	30-54	16-37	7.4-8.4	0-15	2-5	2.0-10.0	14-25
	54-70	16-37	7.4-9.0	0-15	2-5	4.0-16.0	10-35
	70-80	15-35	7.4-9.0	0-10	5-15	4.0-16.0	10-40
EsB:							
Eloso	0-9	30-40	6.6-7.8	0	0	0.0-1.0	0-2
	9-37	30-40	7.4-8.4	0-15	0	0.0-1.0	0-2
	37-80	---	7.4-8.4	---	---	---	---
EvC:							
Esseville	0-10	30-50	6.6-8.4	2-15	0	0.0-4.0	0-5
	10-24	30-60	6.6-8.4	2-15	0-10	2.0-8.0	2-12
	24-34	30-50	6.6-8.4	2-15	5-20	4.0-16.0	13-30
	34-80	30-50	6.6-8.4	2-15	5-20	4.0-16.0	13-30

Table 27.--Chemical Soil Properties--Continued

Map symbol and soil name	Depth	Cation exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	Inches	meq/100 g	pH	Pct	Pct	dS/m	
FaC:							
Fashing	0-7	30-40	7.4-8.4	0-5	0	0.0-4.0	0-2
	7-12	28-39	7.4-8.4	0-3	0-5	0.0-4.0	0-10
	12-80	37-53	7.4-8.4	0-3	0-15	4.0-16.0	13-30
FoB:							
Floresville, eroded	0-11	5.0-15	6.1-7.3	0	0	0	0
	11-31	10-25	6.1-7.8	0	0	0	0
	31-80	15-30	7.4-8.4	5-7	0	0	0
HnC:							
Hindes	0-4	5.0-11	6.1-7.8	0	0	0.0-2.0	0-4
	4-12	10-28	6.1-7.8	0	0	0.0-2.0	0-4
	12-80	3.0-15	7.4-8.4	20-35	0	0.0-2.0	0-4
HoB:							
Houla	0-7	20-32	7.4-8.4	2-5	0	0.0-2.0	0-5
	7-15	20-31	7.4-8.4	5-20	0	0.0-2.0	0-5
	15-58	12-24	7.4-8.4	5-20	0	0.0-2.0	0-5
	58-80	7.4-16	7.4-8.4	10-25	0-2	2.0-10.0	2-12
ImB:							
Imogene, occasionally flooded	0-4	5.0-12	6.1-7.8	0	0	0.0-1.0	0-10
	4-13	6.0-20	6.6-8.4	0-5	0-5	1.0-20.0	5-30
	13-53	6.0-15	7.4-9.0	5-7	0-7	4.0-16.0	15-40
	53-80	4.0-17	6.1-9.0	0	2-15	4.0-16.0	15-40
LaB:							
Laparita, rarely flooded	0-4	5.0-19	6.1-8.4	0-2	0	0.0-2.0	0-12
	4-31	10-28	6.1-8.4	0-10	0	4.0-16.0	2-12
	31-60	10-27	7.9-8.4	0-12	0-20	8.0-16.0	2-20
	60-80	30-40	7.4-8.4	0-10	0-20	4.0-8.0	2-20
LeB:							
Lasalle	0-5	20-40	7.4-8.4	2-15	0-2	0.0-4.0	0-35
	5-24	20-40	7.4-8.4	2-15	0-2	2.0-20.0	0-35
	24-80	20-40	7.4-8.4	2-20	0-20	8.0-16.0	5-40
LnB:							
Leoncita	0-11	7.0-10	7.9-8.4	2-5	0	0.0-4.0	0-10
	11-41	10-15	7.9-8.4	5-7	0	0.0-4.0	0-10
	41-80	10-15	7.9-8.4	10-35	0	0.0-4.0	0-10
LoC:							
Lomart	0-8	10-20	7.4-8.4	5-10	0	0.0-2.0	0-5
	8-24	6.8-13	7.4-8.4	5-15	0	0.0-2.0	0-5
	24-80	---	---	---	---	---	---
MaD:							
Mata	0-14	22-29	7.4-8.4	3-20	0	0.0-2.0	0-12
	14-31	21-32	7.4-8.4	5-40	0	0.0-8.0	0-12
	31-43	21-31	7.4-8.4	5-40	0-5	4.0-16.0	0-8
	43-80	16-37	7.4-9.0	0-15	2-5	4.0-16.0	10-35
McC:							
Maverick	0-15	21-37	7.4-9.0	5-15	0	2.0-4.0	13-16
	15-33	24-37	7.4-8.4	5-15	0-5	7.0-15.0	13-16
	33-38	13-30	7.4-8.4	10-25	0-10	8.0-16.0	13-16
	38-80	16-35	7.4-8.4	5-15	0-15	8.0-16.0	13-16

Table 27.--Chemical Soil Properties--Continued

Map symbol and soil name	Depth	Cation exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	Inches	meq/100 g	pH	Pct	Pct	dS/m	
MgD:							
Mirasol	0-6	4.0-12	7.9-8.4	5-8	0	0.0-2.0	0
	6-16	4.0-14	7.9-8.4	5-8	0	0.0-2.0	0
	16-19	---	---	---	---	---	---
	19-80	---	---	---	---	---	---
MoC:							
Moglia	0-6	8.0-20	7.4-8.4	2-10	0	0.0-2.0	0-5
	6-30	9.0-22	7.4-8.4	5-25	0-1	4.0-8.0	5-35
	30-80	4.0-15	7.4-8.4	5-25	0-20	8.0-16.0	13-40
MtB:							
Montell	0-17	30-41	7.4-8.4	5-25	0	0.0-4.0	0-5
	17-39	30-44	7.4-8.4	5-35	0-3	2.0-8.0	8-30
	39-80	10-37	7.4-8.4	2-40	1-10	4.0-16.0	4-40
MwA:							
Monwebb, occasionally flooded	0-15	16-39	7.4-8.4	5-25	0	0.0-4.0	0-5
	15-40	16-39	7.4-8.4	5-35	0	0.0-12.0	5-18
	40-80	16-39	7.4-8.4	2-40	1-10	2.0-20.0	0-40
OmD:							
Olmedo	0-6	5.0-20	7.4-8.4	40-70	0	0.0-2.0	0
	6-12	5.0-20	7.4-8.4	40-70	0	0.0-2.0	0
	12-38	---	---	---	---	---	---
	38-80	---	---	---	---	---	---
PIT:							
Pits	0-80	---	4.5-8.4	0	0	0.0-8.0	0
PkC:							
Pavelek, severely eroded	0-4	35-40	7.4-8.4	5-10	0	0.0-2.0	0
	4-11	35-40	7.4-8.4	20-25	0	0.0-2.0	0
	11-14	---	7.9-8.4	40-50	0	---	0
	14-80	30-40	7.9-8.4	20-50	0	0.0-2.0	0
PrC:							
Pernitas	0-7	10-20	7.4-8.4	5-10	0	0.0-2.0	0
	7-16	15-30	7.4-8.4	8-17	0	0.0-2.0	0
	16-38	20-30	7.4-8.4	10-20	0	0.0-2.0	0
	38-80	10-30	7.9-8.4	15-40	0-1	0.0-2.0	0-1
PtC:							
Pernitas	0-7	10-25	7.4-8.4	3-10	0	0.0-2.0	0
	7-16	15-30	7.4-8.4	8-17	0	0.0-2.0	0
	16-38	20-30	7.4-8.4	10-20	0	0.0-2.0	0
	38-80	16-28	7.9-8.4	10-40	0	0.0-2.0	0
RNB:							
Rhymes	0-6	1.0-5.0	5.6-7.8	0	0	0.0-2.0	0
	6-43	1.0-5.0	5.6-7.8	0	0	0.0-2.0	0
	43-80	8.0-25	5.6-8.4	0-5	0	0.0-2.0	0-4
Nusil	0-9	0.6-5.4	6.1-7.8	0	0	0	0
	9-25	0.5-7.0	6.1-7.8	0	0	0	0
	25-43	9.3-19	6.1-8.4	0-5	0	0.0-2.0	0-4
	72-80	8.0-16	6.1-8.4	0-15	0	0.0-2.0	0-4

Table 27.--Chemical Soil Properties--Continued

Map symbol and soil name	Depth	Cation exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	Inches	meq/100 g	pH	Pct	Pct	dS/m	
RoB:							
Rosenbrock-----------	0-6	40-45	7.4-8.4	0-2	0	0.0-2.0	0
	6-44	30-45	7.4-8.4	5-20	0	0.0-4.0	0-2
	44-56	30-45	7.4-8.4	5-20	0	0.0-4.0	0-2
	56-63	25-35	7.4-8.4	25-35	0	2.0-8.0	2-8
	63-80	10-25	7.4-8.4	5-30	0	2.0-8.0	4-16
SaB:							
Salco----------------	0-10	11-17	7.4-8.4	1-5	0	0.0-2.0	0-5
	10-20	21-28	7.4-8.4	4-25	0	0.0-2.0	0-10
	20-45	16-28	7.4-8.4	4-25	0	0.0-2.0	0-10
	45-80	4.3-13	7.4-8.4	15-25	0	0.0-2.0	5-20
ScD:							
Sancajo--------------	0-6	5.0-20	7.4-8.4	40-60	0	0.0-2.0	0
	6-11	30-40	7.9-8.4	40-60	0	0	0
	11-18	---	7.9-8.4	40-60	0	0	0
	18-38	30-40	7.9-8.4	20-50	0	0.0-2.0	0
	38-80	---	7.9-8.4	---	---	---	---
SrC:							
Sarnosa--------------	0-15	10-25	7.9-8.4	2-15	0	0.0-2.0	0
	15-30	10-25	7.9-8.4	10-40	0	0.0-2.0	0
	30-51	10-25	7.9-8.4	10-40	0	0.0-2.0	0
	51-80	10-25	7.9-8.4	10-40	0	0.0-2.0	0
StB:							
Sinton, frequently flooded-------------	0-9	15-30	7.4-8.4	0-35	0	0	0
	9-80	15-30	7.4-8.4	0-30	0	0	0
TaB:							
Tela, occasionally flooded-------------	0-8	15-30	6.6-7.8	0-5	0	0.0-2.0	0
	8-16	15-30	6.6-8.4	0-15	0	0.0-2.0	0-2
	16-80	10-30	7.9-8.4	2-30	0	0.0-2.0	0-2
Tela, frequently flooded-------------	0-8	15-30	6.6-7.8	0-5	0	0.0-2.0	0
	8-16	15-30	6.6-8.4	0-15	0	0.0-2.0	0-2
	16-80	10-30	7.9-8.4	2-30	0	0.0-2.0	0-2
ToB:							
Tordia---------------	0-7	25-50	6.6-8.4	0-5	0	0.0-2.0	0
	7-20	25-50	6.6-8.4	5-7	0-3	0.0-2.0	0
	20-39	25-50	6.6-8.4	5-7	0-5	0.0-2.0	0
	39-53	25-50	6.6-8.4	5-7	0-2	2.0-12.0	0-2
	53-80	16-37	7.4-9.0	0-15	2-5	4.0-16.0	10-35
VeC:							
Verick---------------	0-2	1.0-13	6.6-8.4	2-20	0	0.0-2.0	0
	2-8	2.0-15	6.6-8.4	10-30	0	0.0-2.0	---
	8-80	---	7.4-8.4	---	---	---	---
VrC:							
Viboras--------------	0-6	17-42	7.4-8.4	0-20	0-2	2.0-8.0	0-12
	6-28	20-42	7.4-8.4	3-25	0-2	4.0-16.0	0-25
	28-80	20-42	7.9-8.4	5-30	0-5	8.0-32.0	10-35

Table 27.--Chemical Soil Properties--Continued

Map symbol and soil name	Depth	Cation exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	Inches	meq/100 g	pH	Pct	Pct	dS/m	
W:							
Water	0-31	---	---	---	---	---	---
WbB:							
Webb	0-14	2.0-15	5.6-7.3	0	0	0	0
	14-28	15-25	6.1-7.3	0	0	0.0-2.0	0-3
	28-80	15-30	6.6-8.4	0-10	0-1	0.0-4.0	0-10
WeB:							
Weesatche	0-7	10-25	6.6-7.8	0-5	0	0	0
	7-21	15-25	7.4-8.4	0-5	0	0	0
	21-48	15-25	7.9-8.4	5-15	0	0	0
	48-80	12-24	7.9-8.4	10-30	0	0	0
WeC:							
Weesatche	0-7	10-25	6.6-7.8	0-5	0	0	0
	7-21	15-25	7.4-8.4	0-5	0	0	0
	21-48	15-25	7.9-8.4	5-15	0	0	0
	48-80	12-24	7.9-8.4	10-30	0	0	0
WgC:							
Weigang	0-6	8.6-11	6.1-7.8	0	0	0.0-2.0	0
	6-13	11-17	6.1-7.8	0	0	0.0-2.0	0
	13-19	13-19	6.1-7.8	5-7	0	0.0-2.0	0
	19-80	---	---	---	---	---	---
WhC:							
Whitsett	0-4	8.9-21	7.4-8.4	0-2	0	0.0-1.0	0-2
	4-13	20-28	7.4-8.4	0-5	0	0.0-1.0	0-2
	13-31	23-35	7.4-8.4	10-30	0	0.0-1.0	0-3
	31-41	---	---	---	---	---	---
WPD:							
Whitsett	0-4	8.9-21	7.4-8.4	0-2	0	0.0-1.0	0-2
	4-13	20-28	7.4-8.4	0-5	0	0.0-1.0	0-2
	13-31	23-35	7.4-8.4	10-30	0	0.0-1.0	0-3
	31-41	---	---	---	---	---	---
Picosa	0-19	17-29	6.6-7.8	0	0	0.0-2.0	0
	19-80	---	---	---	---	---	---
ZaB:							
Zavala, frequently flooded	0-11	2.0-9.0	6.1-7.8	0-4	0	0.0-2.0	0
	11-80	2.0-9.0	6.6-8.4	0-4	0	0.0-2.0	0
Zavala, occasionally flooded	0-11	2.0-9.0	6.1-7.8	0-4	0	0.0-2.0	0
	11-80	2.0-9.0	6.6-8.4	0-4	0	0.0-2.0	0
ZvC:							
Zavco	0-5	8.0-19	6.1-7.8	0	0	0.0-2.0	0
	5-27	11-27	6.6-8.4	0-20	0	0.0-2.0	0
	27-51	13-24	7.4-8.4	5-30	0-5	0.0-4.0	0-4
	51-80	8.0-27	7.4-8.4	5-30	0-5	0.0-8.0	0-12

Table 28.--Water Features

(Depths of layers are in feet. See text for definitions of terms used in this table. Estimates of the frequency of ponding and flooding apply to the whole year rather than to individual months. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
AgB:										
Aguilares	B	Low	Jan-Dec	---	---	---	---	None	---	None
AlB:										
Alet, occasionally flooded	B	Negligible	Apr-Sep	---	---	---	---	None	Extremely brief	Occasional
Alet, frequently flooded	B	Negligible	Apr-Sep	---	---	---	---	None	Extremely brief	Frequent
AnC:										
Annarose	B	Low	Jan-Dec	---	---	---	---	None	---	None
ANS:										
Area not surveyed	---	---	Jan-Dec	---	---	---	---	---	---	---
BeC:										
Benavides	B	Low	Jan-Dec	---	---	---	---	None	---	None
BkB:										
Bookout	B	Negligible	Jan-Dec	---	---	---	---	None	---	None
BnB:										
Brennan	B	Low	Jan-Dec	---	---	---	---	None	---	None
BrB:										
Brundage	D	Medium	Jan-Dec	---	---	---	---	None	---	None
BsB:										
Brystal	B	Low	Jan-Dec	---	---	---	---	None	---	None
BuA:										
Buchel, occasionally flooded	D	High	May-Sep	---	---	---	---	None	Very brief	Occasional
BzA:										
Buchel, frequently flooded	D	High	May-Sep	---	---	---	---	None	Very brief	Frequent

Table 28.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
CaB:										
Caid	C	Low	Jan-Dec	---	---	---	---	None	---	None
CbB:										
Campbellton	C	Low	Jan-Dec	---	---	---	---	None	---	None
CcB:										
Catarina	D	High	Jan-Dec	---	---	---	---	None	---	None
ChB:										
Chacon	D	Low	Jan-Dec	---	---	---	---	None	---	None
CkB:										
Choke	B	Low	Jan-Dec	---	---	---	---	None	---	None
ClA:										
Cochina, occasionally flooded	D	Medium	Apr-Sep	---	---	---	---	None	Very brief	Occasional
CmA:										
Cochina, frequently flooded	D	Medium	May-Sep	---	---	---	---	None	Very brief	Frequent
CnB:										
Colmena	B	Low	Jan-Dec	---	---	---	---	None	---	None
CoB:										
Conquista	D	High	Jan-Dec	---	---	---	---	None	---	None
CpC:										
Copita	B	Medium	Jan-Dec	---	---	---	---	None	---	None
CtA:										
Coquat, frequently flooded	D	Medium	May-Sep	3.0-6.0	>6.0	---	---	None	Brief	Frequent
CuB:										
Cotulla	D	Medium	Jan-Dec	---	---	---	---	None	---	None
CVB:										
Cotulla	D	Medium	Jan-Dec	---	---	---	---	None	---	None
Maverick	D	Medium	Jan-Dec	---	---	---	---	None	---	None

Table 28.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
CyB:										
Coy	D	Medium	Jan-Dec	---	---	---	---	None	---	None
CZB:										
Czar	B	Negligible	May-Sep	---	---	---	---	None	---	Rare
Clareville, rarely flooded	C	Low	May-Oct	---	---	---	---	None	---	Rare
DAM:										
Dams	D	---	Jan-Dec	---	---	---	---	---	---	---
DsB:										
Dosrios	D	Medium	Jan-Dec	---	---	---	---	None	---	None
EsB:										
Eloso	D	Very high	Jan-Dec	---	---	---	---	None	---	None
EvC:										
Esseville	D	Very high	Jan-Dec	---	---	---	---	None	---	None
FaC:										
Fashing	D	High	Jan-Dec	---	---	---	---	None	---	None
FoB:										
Floresville, eroded	C	Low	Jan-Dec	---	---	---	---	None	---	None
HnC:										
Hindes	C	Medium	Jan-Dec	---	---	---	---	None	---	None
HoB:										
Houla	B	Low	Jan-Dec	---	---	---	---	None	---	None
ImB:										
Imogene, occasionally flooded	C	Low	May-Sep	---	---	---	---	None	Very brief	Occasional
LaB:										
Laparita, rarely flooded	D	Medium	Apr-Sep	---	---	---	---	None	---	Rare
LeB:										
Lasalle	D	High	Jan-Dec	---	---	---	---	None	---	None

Table 28.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
LnB:										
Leoncita	B	Low	Jan-Dec	---	---	---	---	None	---	None
LoC:										
Lomart	C	Low	Jan-Dec	---	---	---	---	None	---	None
MaD:										
Mata	C	Medium	Jan-Dec	---	---	---	---	None	---	None
McC:										
Maverick	D	Medium	Jan-Dec	---	---	---	---	None	---	None
MgD:										
Mirasol	D	Very high	Jan-Dec	---	---	---	---	None	---	None
MoC:										
Moglia	C	Low	Jan-Dec	---	---	---	---	None	---	None
MtB:										
Montell	D	High	Jan-Dec	---	---	---	---	None	---	None
MwA:										
Monwebb, occasionally flooded	D	Very low	May-Sep	---	---	---	---	None	Very brief	Occasional
OmD:										
Olmedo	D	High	Jan-Dec	---	---	---	---	None	---	None
PIT:										
Pits	D	Medium	Jan-Dec	---	---	---	---	---	---	None
PkC:										
Pavelek, severely eroded	D	High	Jan-Dec	---	---	---	---	None	---	None
PrC:										
Pernitas	B	Very low	Jan-Dec	---	---	---	---	None	---	None
PtC:										
Pernitas	B	Very low	Jan-Dec	---	---	---	---	None	---	None

Table 28.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
RNB:										
Rhymes---------------------	A	Very low	Jan-Dec	---	---	---	---	None	---	None
Nusil----------------------	C	Low	Jan-Dec	---	---	---	---	None	---	None
RoB:										
Rosenbrock-----------------	D	Very high	Jan-Dec	---	---	---	---	None	---	None
SaB:										
Salco-	B	Very low	Jan-Dec	---	---	---	---	None	---	None
ScD:										
Sancajo--------------------	D	Very high	Jan-Dec	---	---	---	---	None	---	None
SrC:										
Sarnosa--------------------	B	Medium	Jan-Dec	---	---	---	---	None	---	None
StB:										
Sinton, frequently flooded	B	Very low	Jan-Dec	---	---	---	---	None	Brief	Frequent
TaB:										
Tela, occasionally flooded	B	Negligible	Mar-Nov	---	---	---	---	None	Extremely brief	Occasional
Tela, frequently flooded--	B	Negligible	Mar-Nov	---	---	---	---	None	Extremely brief	Frequent
ToB:										
Tordia---------------------	D	High	Jan-Dec	---	---	---	---	None	---	None
VeC:										
Verick---------------------	D	Low	Jan-Dec	---	---	---	---	None	---	None
VrC:										
Viboras--------------------	D	Very high	Jan-Dec	---	---	---	---	None	---	None
W:										
Water----------------------	---	---	Jan-Dec	---	---	---	---	---	---	---
WbB:										
Webb-----------------------	C	Low	Jan-Dec	---	---	---	---	None	---	None

Table 28.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
WeB:										
Weesatche	B	Very low	Jan-Dec	---	---	---	---	None	---	None
WeC:										
Weesatche	B	Low	Jan-Dec	---	---	---	---	None	---	None
WgC:										
Weigang	D	Medium	Jan-Dec	---	---	---	---	None	---	None
WhC:										
Whitsett	D	Medium	Jan-Dec	---	---	---	---	None	---	None
WPD:										
Whitsett	D	Medium	Jan-Dec	---	---	---	---	None	---	None
Picosa	D	Low	Jan-Dec	---	---	---	---	None	---	None
ZaB:										
Zavala, frequently flooded	A	Very low	May-Sep	---	---	---	---	None	Very brief	Frequent
Zavala, occasionally flooded	A	Very low	May-Sep	---	---	---	---	None	Very brief	Occasional
ZvC:										
Zavco	C	Medium	Jan-Dec	---	---	---	---	None	---	None

Table 29.--Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Restrictive layer				Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Uncoated steel	Concrete
		In	In			
AgB:						
Aguilares	---	---	---	---	High	Low
AlB:						
Alet, occasionally flooded	---	---	---	---	Moderate	Low
Alet, frequently flooded	---	---	---	---	Moderate	Low
AnC:						
Annarose	Densic bedrock	40-60	---	Noncemented	Low	Low
ANS:						
Area not surveyed	---	---	---	---	---	---
BeC:						
Benavides	---	---	---	---	High	Low
BkB:						
Bookout	---	---	---	---	High	Low
BnB:						
Brennan	---	---	---	---	Moderate	Moderate
BrB:						
Brundage	---	---	---	---	High	Moderate
BsB:						
Brystal	---	---	---	---	Moderate	Moderate
BuA:						
Buchel, occasionally flooded	---	---	---	---	High	Low
BzA:						
Buchel, frequently flooded	---	---	---	---	High	Low
CaB:						
Caid	---	---	---	---	Moderate	Low
CbB:						
Campbellton	Densic bedrock	60-80	---	Noncemented	High	Low
CcB:						
Catarina	---	---	---	---	High	High
ChB:						
Chacon	---	---	---	---	High	Low
CkB:						
Choke	Densic bedrock	60-80	---	Noncemented	Moderate	Moderate

Table 29.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Uncoated steel	Concrete
		In	In			
ClA:						
Cochina, occasionally flooded	---	---	---	---	High	Moderate
CmA:						
Cochina, frequently flooded	---	---	---	---	High	Moderate
CnB:						
Colmena	---	---	---	---	Moderate	Moderate
CoB:						
Conquista	---	---	---	---	High	Low
CpC:						
Copita	Paralithic bedrock	20-40	---	Weakly cemented	High	Low
CtA:						
Coquat, frequently flooded	---	---	---	---	High	Moderate
CuB:						
Cotulla	Densic material	60-80	---	Noncemented	Moderate	Low
CVB:						
Cotulla	Densic material	60-80	---	Noncemented	Moderate	Low
Maverick	Densic bedrock	20-40	---	Noncemented	High	Low
CyB:						
Coy	---	---	---	---	High	Low
CZB:						
Czar	---	---	---	---	Moderate	Low
Clareville, rarely flooded	---	---	---	---	High	Moderate
DAM:						
Dams	---	---	---	---	Moderate	---
DsB:						
Dosrios	Densic material	60-80	---	Noncemented	High	Low
EsB:						
Eloso	Paralithic bedrock	20-40	---	Weakly cemented	High	Low
EvC:						
Esseville	Densic bedrock	20-40	---	Noncemented	High	Low
FaC:						
Fashing	Densic bedrock	10-20	---	Noncemented	High	Low
FoB:						
Floresville, eroded	---	---	---	---	High	Low

Table 29.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Uncoated steel	Concrete
		In	In			
HnC:						
Hindes	---	---	---	---	Moderate	Low
HoB:						
Houla	---	---	---	---	High	Moderate
ImB:						
Imogene, occasionally flooded	---	---	---	---	High	High
LaB:						
Laparita, rarely flooded	---	---	---	---	High	Low
LeB:						
Lasalle	---	---	---	---	High	Moderate
LnB:						
Leoncita	---	---	---	---	High	Low
LoC:						
Lomart	Paralithic bedrock	20-40	---	Moderately cemented	Low	Low
MaD:						
Mata	Densic bedrock	40-60	---	Noncemented	High	Low
McC:						
Maverick	Densic bedrock	20-40	---	Noncemented	High	Low
MgD:						
Mirasol	Duripan	8-20	20-80	Indurated	High	Low
MoC:						
Moglia	---	---	---	---	High	Low
MtB:						
Montell	---	---	---	---	High	Moderate
MwA:						
Monwebb, occasionally flooded	---	---	---	---	High	Moderate
OmD:						
Olmedo	Petrocalcic	10-20	10-40	Indurated	High	Low
PIT:						
Pits	---	---	---	---	High	Low
PkC:						
Pavelek, severely eroded	Petrocalcic	10-20	1-10	Strongly cemented	High	Low
	Paralithic bedrock	10-20	---	Weakly cemented		
PrC:						
Pernitas	---	---	---	---	High	Low

Table 29.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Uncoated steel	Concrete
		In	In			
PtC:						
Pernitas	---	---	---	---	High	Low
RNB:						
Rhymes	---	---	---	---	Low	Moderate
Nusil	---	---	---	---	Low	Moderate
RoB:						
Rosenbrock	Densic bedrock	60-80	---	Noncemented	High	Low
SaB:						
Salco	---	---	---	---	High	Low
ScD:						
Sancajo	Petrocalcic	10-20	4-9	Indurated	Low	Low
	Paralithic bedrock	20-40	---	Weakly cemented		
SrC:						
Sarnosa	---	---	---	---	Moderate	Low
StB:						
Sinton, frequently flooded	---	---	---	---	Moderate	Low
TaB:						
Tela, occasionally flooded	---	---	---	---	Moderate	Low
Tela, frequently flooded	---	---	---	---	Moderate	Low
ToB:						
Tordia	Densic bedrock	40-60	---	Noncemented	High	Low
VeC:						
Verick	Paralithic bedrock	6-20	---	Weakly cemented	Moderate	Low
VrC:						
Viboras	Densic bedrock	20-40	---	Noncemented	High	High
W:						
Water	---	---	---	---	---	---
WbB:						
Webb	---	---	---	---	High	Low
WeB:						
Weesatche	---	---	---	---	Moderate	Low
WeC:						
Weesatche	---	---	---	---	Moderate	Low
WgC:						
Weigang	Paralithic bedrock	8-20	---	Weakly cemented	Moderate	Low

Table 29.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Uncoated steel	Concrete
		In	In			
WhC:						
Whitsett	Paralithic bedrock	20-40	---	Weakly cemented	Moderate	Low
WPD:						
Whitsett	Paralithic bedrock	20-40	---	Weakly cemented	Moderate	Low
Picosa	Paralithic bedrock	6-20	---	Weakly cemented	Moderate	Low
ZaB:						
Zavala, frequently flooded	---	---	---	---	Moderate	Low
Zavala, occasionally flooded	---	---	---	---	Moderate	Low
ZvC:						
Zavco	---	---	---	---	High	Moderate

Table 30.--Taxonomic Classification of the Soils

(An asterisk in the first column indicates a taxadjunct to the series. See text for a description of those characteristics that are outside the range of the series.)

Soil name	Family or higher taxonomic class
Aguilares	Fine-loamy, mixed, superactive, hyperthermic Aridic Calciustepts
Alet	Fine-loamy, mixed, superactive, hyperthermic Typic Argiustolls
Annarose	Coarse-loamy, mixed, superactive, hyperthermic Aridic Calciustepts
Benavides	Fine-loamy, mixed, superactive, hyperthermic Aridic Calciustolls
Bookout	Fine-silty, mixed, superactive, hyperthermic Aridic Calciustepts
Brennan	Fine-loamy, mixed, superactive, hyperthermic Aridic Haplustalfs
Brundage	Fine-loamy, mixed, active, hyperthermic Aridic Natrustalfs
Brystal	Fine-loamy, mixed, active, hyperthermic Aridic Paleustalfs
Buchel	Fine, smectitic, hyperthermic Typic Haplusterts
Caid	Fine-loamy, mixed, active, hyperthermic Aridic Paleustolls
Campbellton	Fine, smectitic, hyperthermic Typic Argiustolls
Catarina	Fine, smectitic, hyperthermic Sodic Haplusterts
Chacon	Fine, smectitic, hyperthermic Torrertic Argiustolls
Choke	Fine-silty, mixed, superactive, hyperthermic Aridic Calciustolls
Clareville	Fine, smectitic, hyperthermic Pachic Argiustolls
Cochina	Very-fine, smectitic, hyperthermic Sodic Haplusterts
Colmena	Fine-loamy, mixed, superactive, hyperthermic Typic Argiustolls
Conquista	Fine-loamy, mixed, superactive, hyperthermic Entic Haplustolls
Copita	Fine-loamy, mixed, superactive, hyperthermic Aridic Calciustepts
Coquat	Fine, smectitic, hyperthermic Sodic Haplusterts
Cotulla	Fine, smectitic, hyperthermic Sodic Haplusterts
Coy	Fine, smectitic, hyperthermic Pachic Vertic Argiustolls
Czar	Fine-loamy, mixed, superactive, hyperthermic Pachic Argiustolls
Dosrios	Fine, smectitic, hyperthermic Sodic Haplusterts
Eloso	Fine, smectitic, hyperthermic Vertic Haplustolls
Esseville	Fine, smectitic, hyperthermic Sodic Gypsiusterts
Fashing	Clayey, smectitic, hyperthermic, shallow Entic Haplustolls
Floresville	Fine, mixed, active, hyperthermic Typic Paleustalfs
Hindes	Clayey-skeletal, mixed, active, hyperthermic Aridic Argiustolls
Houla	Fine-loamy, mixed, superactive, hyperthermic Aridic Calciustolls
Imogene	Fine-loamy, mixed, superactive, hyperthermic Mollic Natrustalfs
Laparita	Fine, smectitic, hyperthermic Pachic Vertic Argiustolls
Lasalle	Fine, smectitic, hyperthermic Sodic Haplusterts
Leoncita	Fine-loamy, mixed, superactive, hyperthermic Aridic Calciustolls
Lomart	Coarse-loamy, mixed, superactive, hyperthermic Aridic Calciustepts
Mata	Loamy-skeletal, mixed, superactive, hyperthermic Aridic Calciustepts
Maverick	Fine, smectitic, hyperthermic Aridic Haplustepts
Mirasol	Loamy-skeletal, mixed, superactive, hyperthermic, shallow Typic Durustepts
Moglia	Fine-loamy, mixed, active, hyperthermic Aridic Calciustepts
Montell	Fine, smectitic, hyperthermic Sodic Haplusterts
Monwebb	Fine, smectitic, hyperthermic Sodic Haplusterts
Nusil	Loamy, siliceous, active, hyperthermic Arenic Paleustalfs
Olmedo	Loamy-skeletal, carbonatic, hyperthermic, shallow Petrocalcic Calciustolls
Pavelek	Clayey, smectitic, hyperthermic, shallow Petrocalcic Calciustolls
Pernitas	Fine-loamy, mixed, superactive, hyperthermic Typic Argiustolls
Picosa	Loamy, mixed, superactive, hyperthermic, shallow Entic Haplustolls
Rhymes	Loamy, siliceous, active, hyperthermic Grossarenic Paleustalfs
Rosenbrock	Fine, smectitic, hyperthermic Typic Haplusterts
Salco	Fine-loamy, mixed, superactive, hyperthermic Aridic Argiustolls
Sancajo	Loamy-skeletal, mixed, superactive, hyperthermic, shallow Petrocalcic Calciustolls
Sarnosa	Coarse-loamy, mixed, superactive, hyperthermic Typic Calciustolls
Sinton	Fine-loamy, mixed, superactive, hyperthermic Cumulic Haplustolls
Tela	Fine-loamy, mixed, superactive, hyperthermic Aridic Argiustolls
Tordia	Fine, smectitic, hyperthermic Typic Haplusterts
Verick	Loamy, mixed, active, hyperthermic, shallow Aridic Haplustalfs
Viboras	Fine, mixed, superactive, hyperthermic Torrertic Haplustepts
Webb	Fine, smectitic, hyperthermic Aridic Paleustalfs
Weesatche	Fine-loamy, mixed, superactive, hyperthermic Typic Argiustolls

Table 30.--Taxonomic Classification of the Soils--Continued

Soil name	Family or higher taxonomic class
Weigang	Loamy, mixed, active, hyperthermic, shallow Typic Argiustolls
Whitsett	Fine-loamy, mixed, superactive, hyperthermic Typic Argiustolls
Zavala	Coarse-loamy, mixed, superactive, nonacid, hyperthermic Typic Ustifluvents
Zavco	Fine, mixed, active, hyperthermic Aridic Argiustolls

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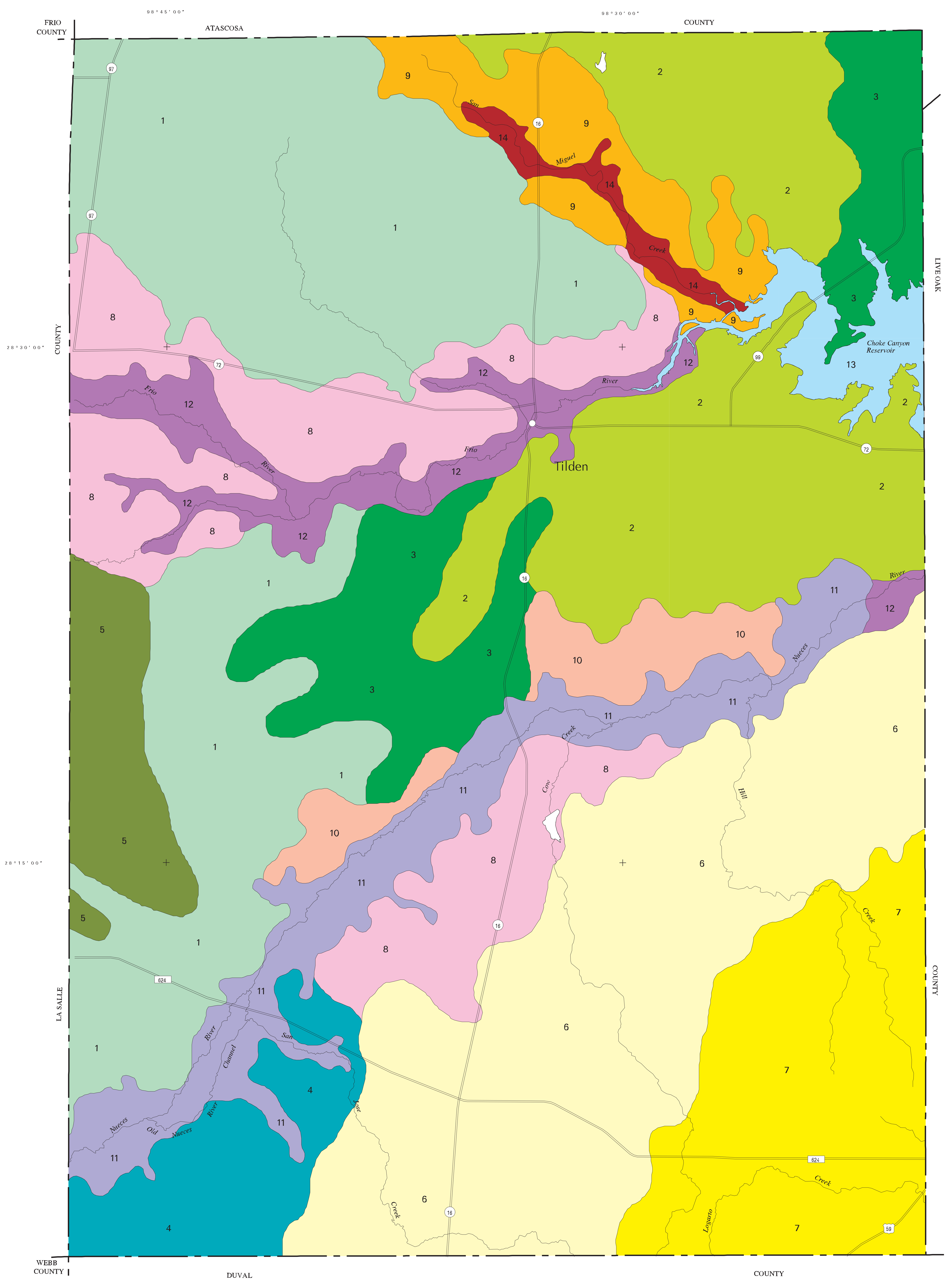
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98°30'00"
FRIO COUNTY
ATASCOSA
COUNTY
LIVE OAK
COUNTY
28°20'00"
28°15'00"
LA SALLE
COUNTY
WEBB COUNTY
DUVAL
COUNTY
San Miguel Creek
Frio River
Nueces River
Choke Canyon Reservoir
Tilden
Cow Creek
Hill
Creek
Lagarto
Old Nueces River
River Channel
San
Jose
Creek
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16
72
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LEGEND

VERY DEEP, DEEP, AND MODERATELY DEEP, CLAYEY AND LOAMY SOILS ON INTERFLUVES AND STREAM TERRACES

1	Montell-Esseville-Cotulla
2	Dosrios-Campbellton-Esseville
3	Campbellton-Whitsett
4	Montell-Aguilares-Moglia
5	Maverick-Cotulla

VERY DEEP, DEEP, AND MODERATELY DEEP LOAMY SOILS ON INTERFLUVES, PALEOTERRACES, AND EROSION REMNANTS

6	Houla-Salco-Lomart
7	Pernitas-Weesatche-Sarnosa

VERY DEEP, LOAMY SOILS ON PALEOTERRACES AND STREAM TERRACES

8	Caid-Leoncita-Brennan
9	Brundage-Floresville-Colmena
10	Chacon-Caid

VERY DEEP, CLAYEY SOILS ON FLOOD PLAINS

11	Cochina-Coquat
12	Cochina-Buchel

WATER

13	Water

VERY DEEP, LOAMY SOILS ON FLOOD PLAINS

14	Zavala-Sinton

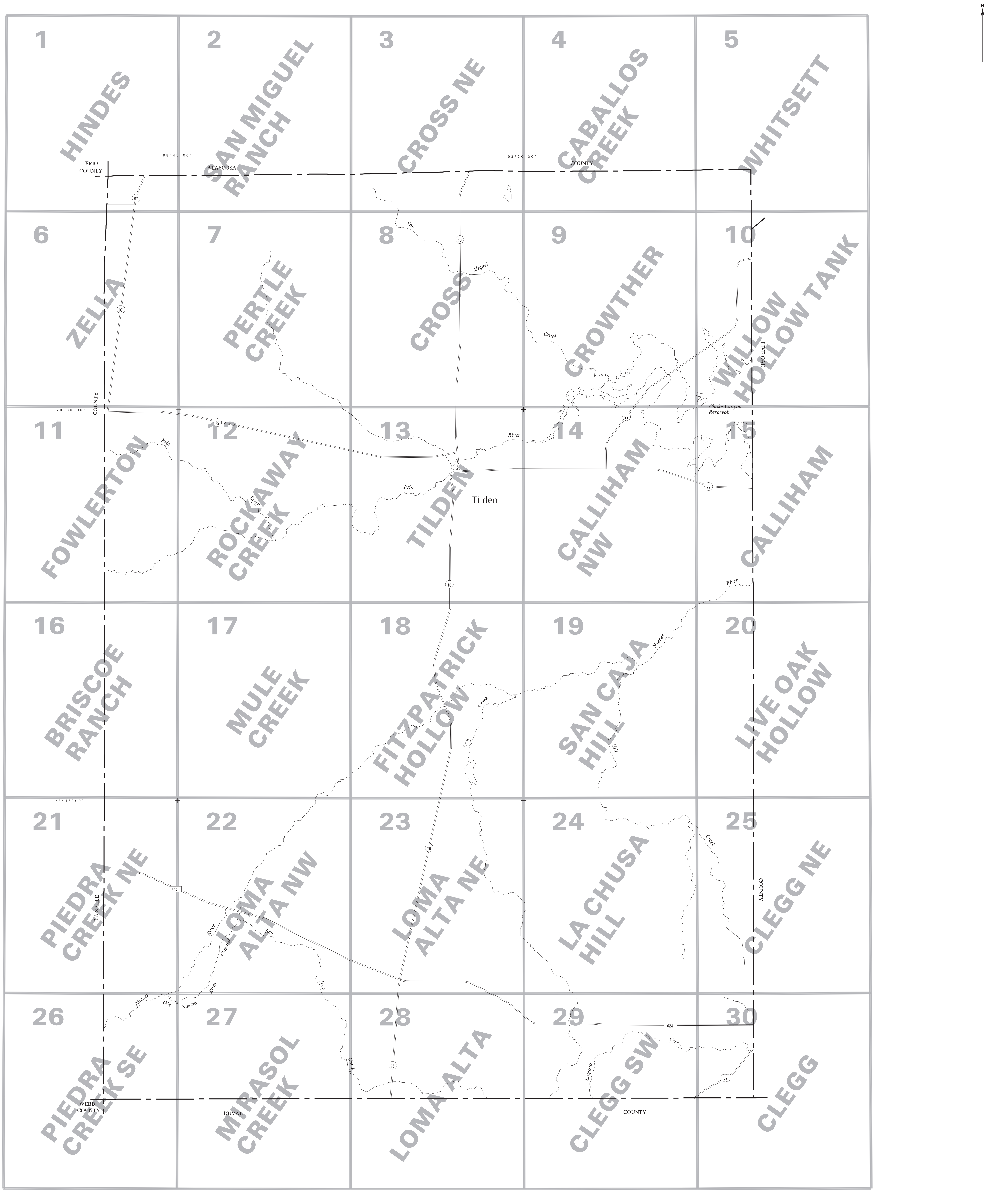
UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
TEXAS AGRILIFE RESEARCH

GENERAL SOIL MAP
MCMULLEN COUNTY, TEXAS

1 0 1 2 3
MILES
1 0 1 2 3 4 5 6
KILOMETERS

SCALE = 1:140000

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



N
1 HINDES
2 SAN MIGUEL RANCH
3 CROSS NE
4 CABALLOS CREEK
5 WHITSETT
6 ZELLA
7 PERTLE CREEK
8 CROSS
9 CROWTHER
10 WILLOW HOLLOW TANK
11 FOWLERTON
12 ROCKAWAY CREEK
13 TILDEN
14 CALLIHAM NW
15 CALLIHAM
16 BRISCOE RANCH
17 MULE CREEK
18 FITZPATRICK HOLLOW
19 SAN CAJA HILL
20 LIVE OAK HOLLOW
21 PIEDRA CREEK NE
22 LOMA ALTA NW
23 LOMA ALTA NE
24 LA CHUSA HILL
25 CLEGG NE
26 PIEDRA CREEK SE
27 MIRASOL CREEK
28 LOMA ALTA
29 CLEGG SW
30 CLEGG
98°45'00"
98°30'00"
28°30'00"
28°15'00"
FRIO COUNTY
ATASCOSA COUNTY
LIVE OAK COUNTY
LA SALLE COUNTY
WEBB COUNTY
DUVAL COUNTY
Tilden
Choke Canyon Reservoir
San Miguel Creek
Frio River
Nueces River
Old Nueces River
River Channel
Cow Creek
Hill
Creek
San Jose Creek
Lagarto
97
16
72
99
624
59

INDEX TO MAP SHEETS
MCMULLEN COUNTY, TEXAS

1 0 1 2 3

MILES

1 0 1 2 3 4 5 6

KILOMETERS

SCALE = 1:140000

SOIL LEGEND

Soil map symbols are in alphabetical order. The first letter, always a capital, is the initial letter of the soil series or miscellaneous area name. The second letter is lowercase, except in associations, undifferentiated groups, and miscellaneous area name. The third letter, if present, represents the slope class.

SYMBOL	NAME
AgB	Aguilares fine sandy loam, 0 to 3 percent slopes
AlB	Alet sandy clay loam, 0 to 2 percent slopes, flooded
AnC	Annarose fine sandy loam, 2 to 5 percent slopes
ANS	Area not surveyed
BeC	Benavides fine sandy loam, 2 to 5 percent slopes
BkB	Bookout clay loam, 0 to 2 percent slopes
BnB	Brennan fine sandy loam, 0 to 3 percent slopes
BrB	Brundage fine sandy loam, 0 to 2 percent slopes
BsB	Brystal fine sandy loam, 0 to 3 percent slopes
BuA	Buchel clay, 0 to 1 percent slopes, occasionally flooded
BzA	Buchel clay, 0 to 1 percent slopes, frequently flooded
CaB	Caid sandy clay loam, 0 to 3 percent slopes
CbB	Campbellton clay loam, 1 to 3 percent slopes
CcB	Catarina clay, 0 to 2 percent slopes
ChB	Chacon sandy clay loam, 0 to 2 percent slopes
CkB	Choke silty clay loam, 1 to 3 percent slopes
ClA	Cochina clay, 0 to 1 percent slopes, occasionally flooded
CmA	Cochina clay, 0 to 1 percent slopes, frequently flooded
CnB	Colmena fine sandy loam, 0 to 3 percent slopes
CoB	Conquista clay, 1 to 3 percent slopes
CpC	Copita sandy clay loam, 1 to 5 percent slopes
CtA	Coquat clay, 0 to 1 percent slopes, frequently flooded
CuB	Cotulla clay loam, 0 to 3 percent slopes
CVB	Cotulla-Maverick complex, 1 to 3 percent slopes
CyB	Coy clay loam, 1 to 3 percent slopes
CZB	Czar-Clareville complex, 0 to 2 percent slopes, rarely flooded
DAM	Dams
DsB	Dosrios clay, 1 to 3 percent slopes
EsB	Eloso clay, 0 to 3 percent slopes
EvC	Esseville clay, 1 to 5 percent slopes
FaC	Fashing clay, 1 to 5 percent slopes
FoB	Floresville fine sandy loam, 0 to 3 percent slopes
HnC	Hindes very gravelly sandy clay loam, 1 to 5 percent slopes
HoB	Houla clay loam, 1 to 3 percent slopes
ImB	Imogene fine sandy loam, 0 to 2 percent slopes, occasionally flooded
LaB	Laparita clay loam, 0 to 3 percent slopes, rarely flooded
LeB	Lasalle clay, 1 to 3 percent slopes
LnB	Leoncita fine sandy loam, 1 to 3 percent slopes
LoC	Lomart loam, 1 to 5 percent slopes
MaD	Mata very gravelly sandy clay loam, 1 to 8 percent slopes
McC	Maverick clay, 2 to 5 percent slopes
MgD	Mirasol gravelly sandy loam, 1 to 8 percent slopes
MoC	Moglia sandy clay loam, 1 to 5 percent slopes
MtB	Montell clay, 0 to 3 percent slopes
MwA	Monwebb clay, 0 to 1 percent slopes, occasionally flooded
OmD	Olmedo very gravelly loam, 1 to 8 percent slopes
PIT	Pits, 1 to 5 percent slopes
PkC	Pavelek clay loam, 3 to 5 percent slopes, severely eroded
PrC	Pernitas fine sandy loam, 1 to 5 percent slopes
PtC	Pernitas sandy clay loam, 1 to 5 percent slopes
RNB	Rhymes-Nusil complex, 1 to 3 percent slopes
RoB	Rosenbrock clay, 1 to 3 percent slopes
SaB	Salco fine sandy loam, 1 to 3 percent slopes
ScD	Sancajo very gravelly loam, 1 to 8 percent slopes
SrC	Sarnosa fine sandy loam, 2 to 5 percent slopes
StB	Sinton sandy clay loam, 0 to 2 percent slopes, frequently flooded
TaB	Tela sandy clay loam, 0 to 2 percent slopes, flooded
ToB	Tordia clay, 0 to 3 percent slopes
VeC	Verick fine sandy loam, 1 to 5 percent slopes
VrC	Viboras clay, 1 to 5 percent slopes
W	Water
WbB	Webb very fine sandy loam, 1 to 3 percent slopes
WeB	Weesatche fine sandy loam, 0 to 3 percent slopes
WeC	Weesatche fine sandy loam, 3 to 5 percent slopes
WgC	Weigang fine sandy loam, 1 to 20 percent slopes
WhC	Whitsett fine sandy loam, 1 to 5 percent slopes
WPD	Whitsett-Picosa complex, 1 to 8 percent slopes
ZaB	Zavala fine sandy loam, 0 to 2 percent slopes, flooded
ZvC	Zavco sandy clay loam, 1 to 5 percent slopes

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state, or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park)
- Land grant
- Limit of soil survey (label) and/or denied access area
- Field sheet matchline and neatline
- Previously published survey

OTHER BOUNDARY

- Airport, airfield
- Cemetery
- City/county park

STATE COORDINATE TICK
1 890 000 FEET

LAND DIVISION CORNER
(section and land grants)

GEOGRAPHIC COORDINATE TICK +

TRANSPORTATION

- Divided roads
- Other roads
- Trail

ROAD EMBLEMS AND DESIGNATIONS

- Interstate 173 79 345
- Federal 287 410 224
- State 52 52 347
- County, farm or ranch 1283

RAILROAD

POWER TRANSMISSION LINE

PIPELINE

FENCE

LEVEES

- Without road
- With road
- With railroad
- Single side slope

DAMS

- Medium or small W

LANDFORM FEATURES

- Prominent hill or peak
- Soil sample site

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house ■
- Church
- School
- Other religion ▲ Mt Carmel
- Located object ⊙ Ranger Station
- Tank ● Petroleum
- Lookout tower
- Oil and/or natural gas wells
- Windmill
- Lighthouse

HYDROGRAPHIC FEATURES

RIVERS, STREAMS, DRAINAGE AND IRRIGATION

- Watercourse

SMALL LAKES, PONDS, AND RESERVOIRS

- Perennial water ◉
- Miscellaneous water ◎
- Flood pool line FLOOD POOL LINE

MISCELLANEOUS WATER FEATURES

- Spring
- Well, artesian
- Well, irrigation

SPECIAL SYMBOLS FOR SOIL SURVEY AND SSURGO

SOIL DELINEATIONS AND SYMBOLS AnA BnB

LANDFORM FEATURES

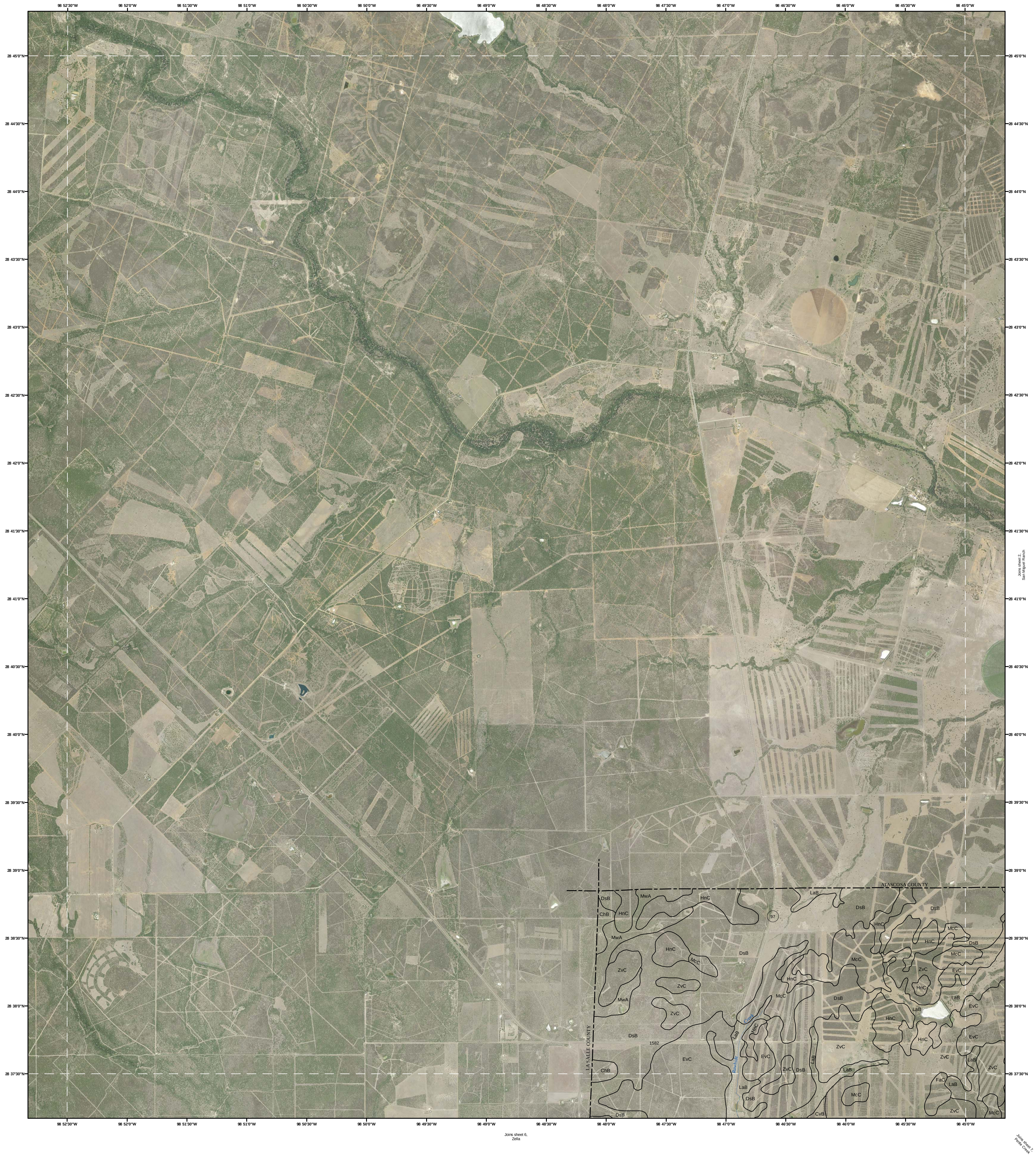
- Bedrock escarpment
- Other than bedrock escarpment
- Short steep slope
- Gully
- Depression, closed ◆
- Sinkhole ◇
- Borrow pit ⊠
- Gravel pit
- Mine or quarry
- Landfill

MISCELLANEOUS SURFACE FEATURES

- Blowout
- Clay spot
- Gravelly spot
- Lava spot
- Marsh or swamp
- Rock outcrop (includes sandstone and shale) ∨
- Saline spot +
- Sandy spot
- Severely eroded spot
- Slide or slip
- Sodic spot
- Spoil area
- Stony spot
- Very stony spot
- Wet spot

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MCMULLEN COUNTY, TEXAS
HINDES QUADRANGLE
SHEET NUMBER 01 OF 30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LA SALLE COUNTY
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HnC
LaB
ChB
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MwA
HnC
McC
DsB
ZvC
ZvC
MwA
ZvC
McC
HnC
DsB
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EvC
LaB
HnC
Rawhide Creek
EvC
ZvC
DsB
LaB
ChB
LaB
DsB
CvB
McC
ZvC
HnC
McC
HnC
DsB
McC
EvC
HnC
LaB
LaB
EvC
EvC
HnC
ZvC
LaB
ZvC
FaC
LaB
ZvC
McC
Joins sheet 2, San Miguel Ranch
Joins sheet 6, Zella
Joins sheet 7, Pertle Creek

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service, from 2008 National Agriculture Imagery Program (NAIP) photography. Hydrography and cultural layers were acquired from U.S. Department of Agriculture, Natural Resources Conservation Service. The hydrography and cultural layers were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 13. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

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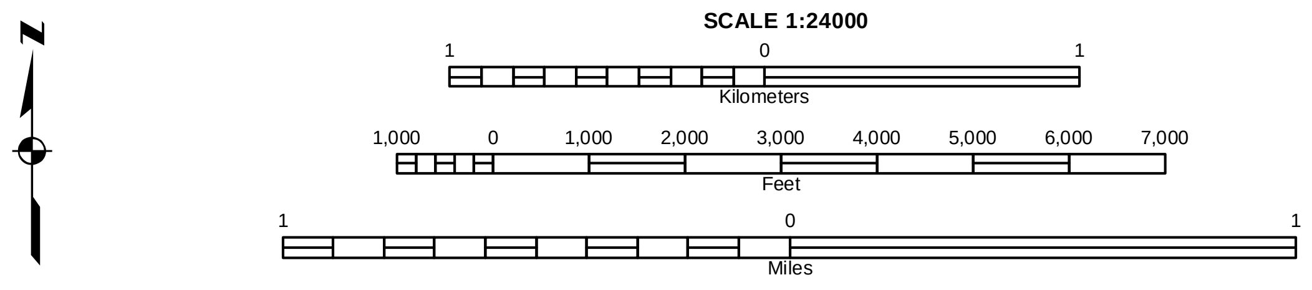
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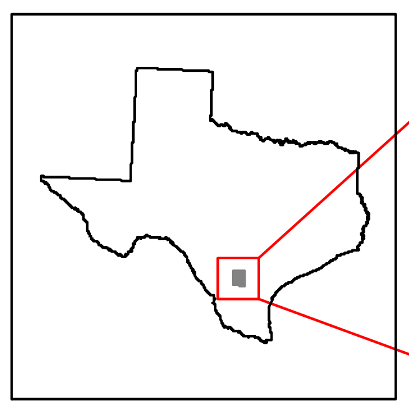
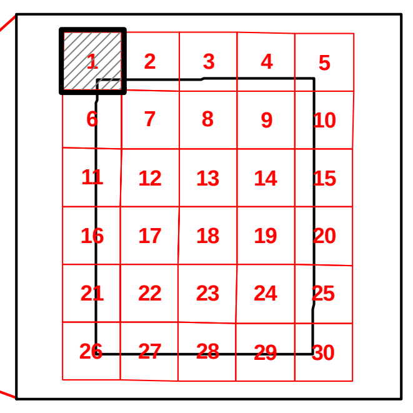


MCMULLEN COUNTY LOCATION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QUADRANGLE LOCATION

HINDES, TEXAS

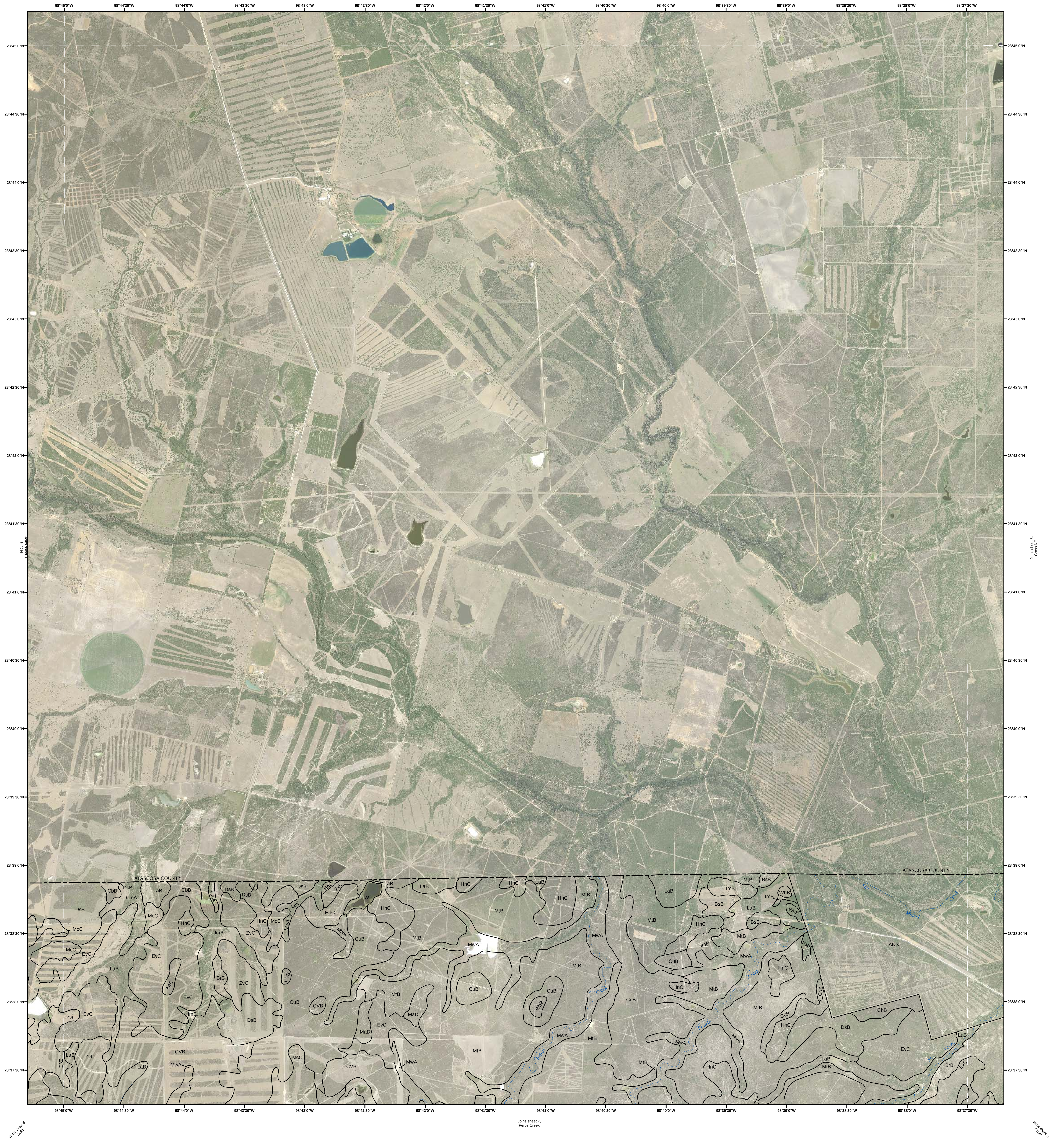
7.5 MINUTE SERIES

SHEET NUMBER 01 OF 30

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MCMULLEN COUNTY, TEXAS
SAN MIGUEL RANCH QUADRANGLE
SHEET NUMBER 02 OF 30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98°41'30"W
98°41'0"W
98°40'30"W
98°40'0"W
98°39'30"W
98°39'0"W
98°38'30"W
98°38'0"W
98°37'30"W
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28°44'30"N
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28°40'30"N
28°40'0"N
28°39'30"N
28°39'0"N
28°38'30"N
28°38'0"N
28°37'30"N
Joins sheet 1,
Hindes
Joins sheet 3,
Cross NE
Joins sheet 6,
Zella
Joins sheet 7,
Pertle Creek
Joins sheet 8,
Cross
ATASCOSA COUNTY
ATASCOSA COUNTY
CbB
DsB
CmA
LaB
CbB
CmA
DsB
DsB
DsB
HnC
ZvC
LaB
W
LaB
HnC
HnC
LaB
DsB
McC
McC
HnC
HnC
McC
MwA
LaB
HnC
MwA
ImB
ZvC
CuB
McC
EvC
EvC
LaB
EvC
FaC
BrB
ZvC
CVB
EvC
ImB
ZvC
EvC
DsB
CuB
CVB
CuB
MtB
MwA
MtB
MtB
CuB
WbB
MaD
EvC
MaD
LaB
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CuB
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DsB
CbB
MwA
MwA
MtB
LaB
EvC
LaB
MtB
HnC
MtB
BrB
EvC
San Miguel Creek
Indian Creek
Prairie Creek
Fox Creek

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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 13. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

N

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Kilometers

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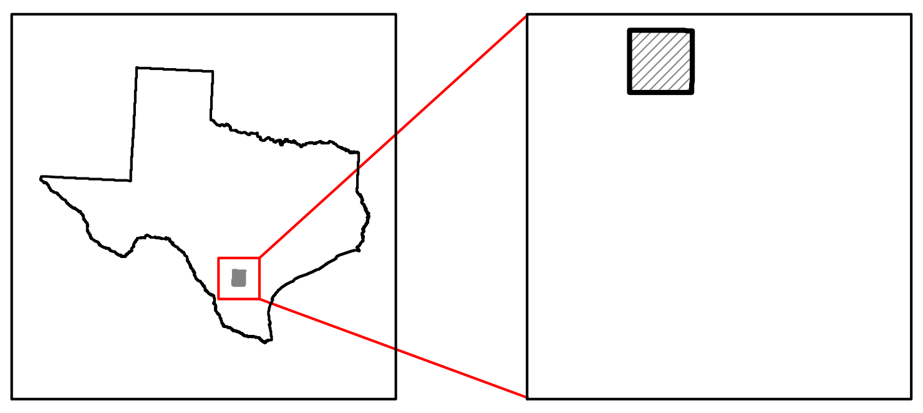
Feet

1 0 1
Miles



MCMULLEN COUNTY LOCATION

QUADRANGLE LOCATION

SAN MIGUEL RANCH, TEXAS

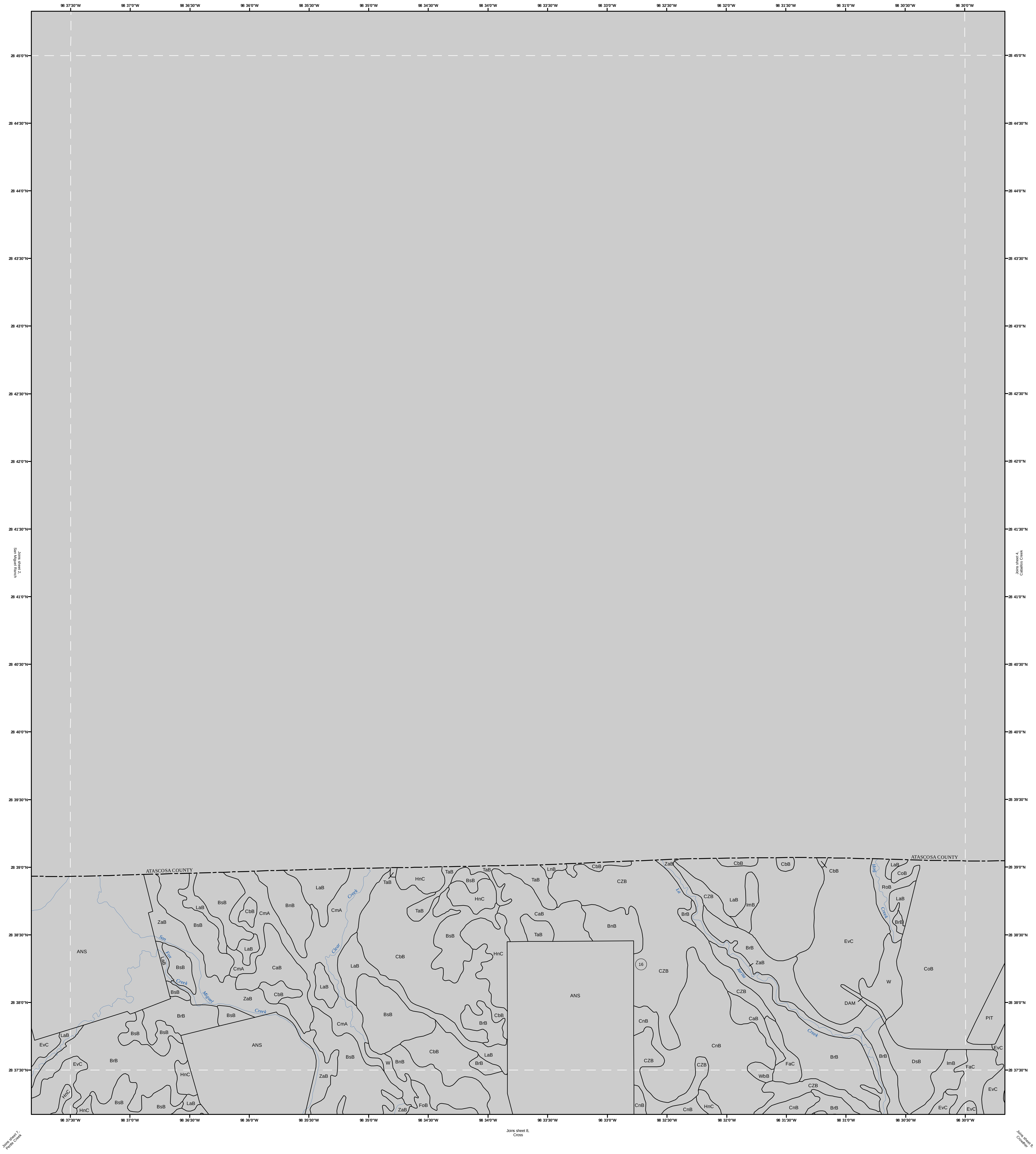
7.5 MINUTE SERIES

SHEET NUMBER 02 OF 30

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MCMULLEN COUNTY, TEXAS
CROSS NE QUADRANGLE
SHEET NUMBER 03 OF 30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98 36'30"W
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98 33'30"W
98 33'0"W
98 32'30"W
98 32'0"W
98 31'30"W
98 31'0"W
98 30'30"W
98 30'0"W
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28 44'30"N
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28 40'30"N
28 40'0"N
28 39'30"N
28 39'0"N
28 38'30"N
28 38'0"N
28 37'30"N
Joins sheet 2, San Miguel Ranch
Joins sheet 4, Caballos Creek
Joins sheet 7, Perlitz Creek
Joins sheet 8, Cross
Joins sheet 9, Crowther
ATASCOSA COUNTY
ATASCOSA COUNTY
San Miguel Creek
Clear Creek
La Jarita Creek
Hog Creek
16
ANS
ZaB
LaB
BsB
CbB
CmA
BnB
LaB
CmA
TaB
HnC
TaB
BsB
TaB
HnC
TaB
LnB
CbB
CZB
ZaB
CbB
CbB
CbB
LaB
CoB
RoB
LaB
BrB
CaB
TaB
BsB
BnB
HnC
CaB
CbB
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CZB
LaB
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BrB
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EvC
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CbB
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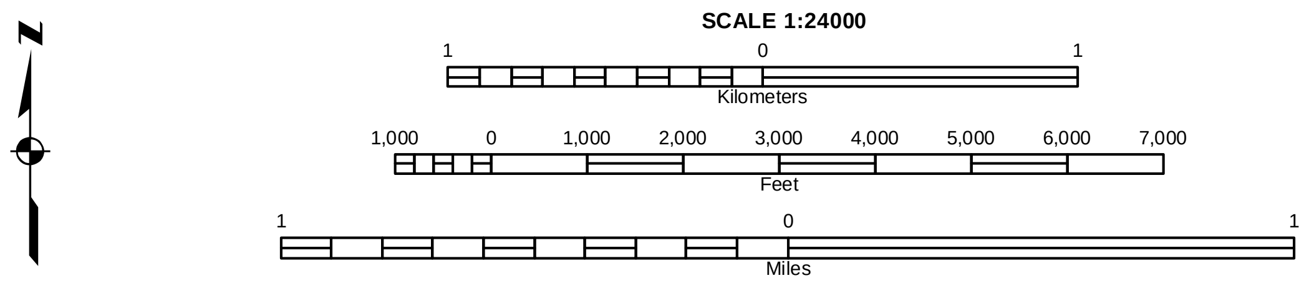
CZB
CnB
CnB
HnC
WbB
FaC
CZB
CnB
BrB
BrB
BrB
DsB
ImB
FaC
EvC
EvC
EvC

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service, from 2008 National Agriculture Imagery Program (NAIP) photography. Hydrography and cultural layers were acquired from U.S. Department of Agriculture, Natural Resources Conservation Service. The hydrography and cultural layers were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 13. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.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Feet
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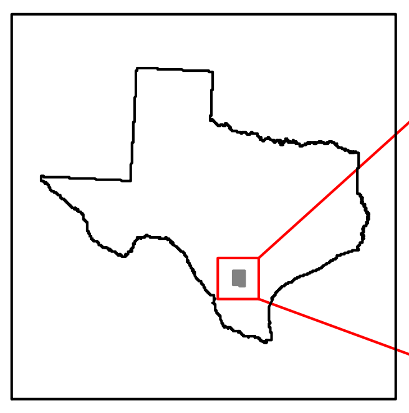
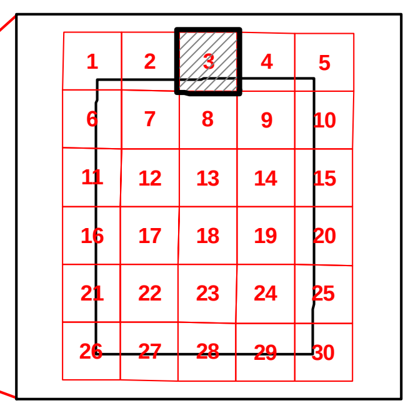
Miles



MCMULLEN COUNTY LOCATION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30

QUADRANGLE LOCATION

CROSS NE, TEXAS

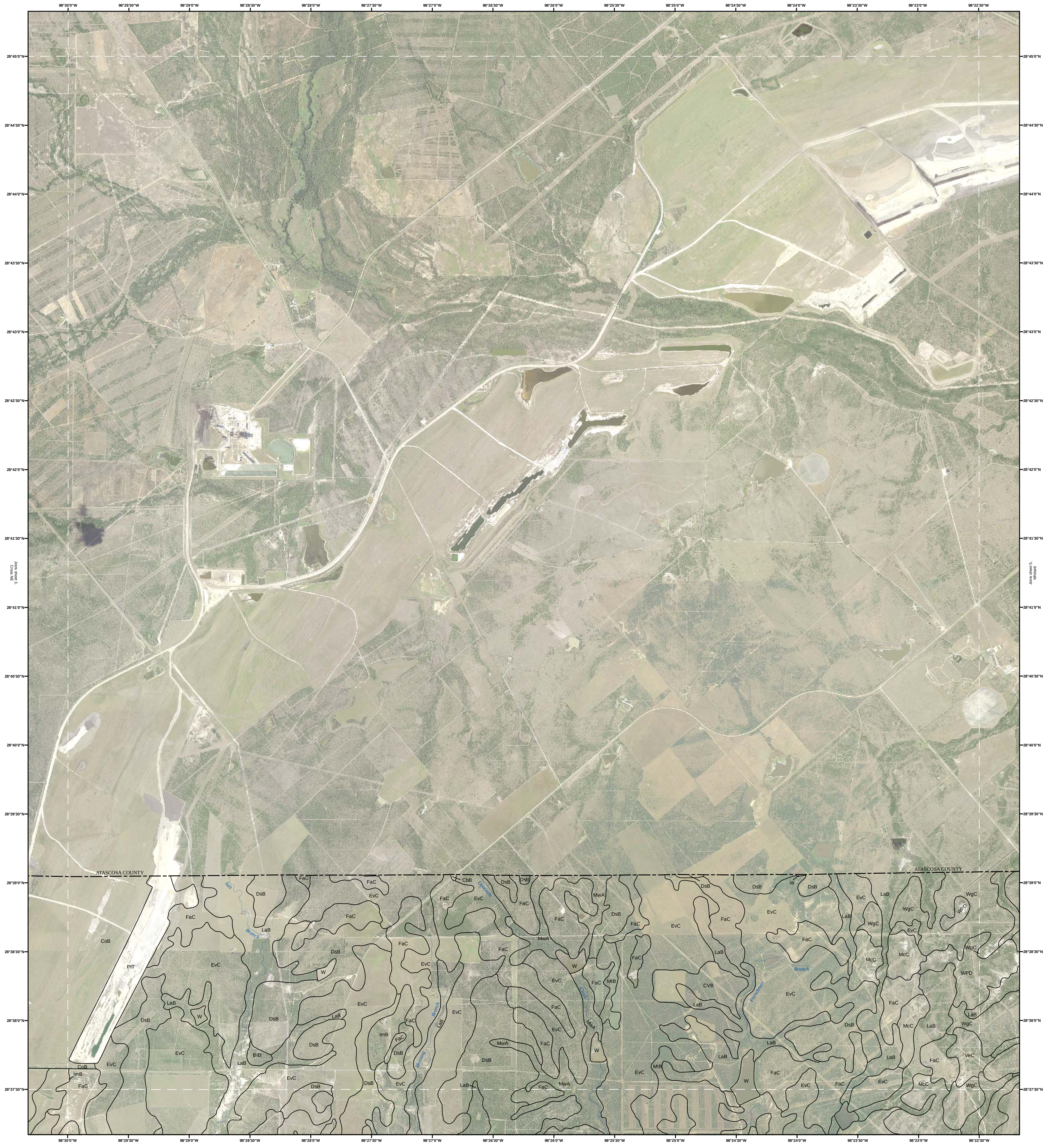
7.5 MINUTE SERIES

SHEET NUMBER 03 OF 30

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MCMULLEN COUNTY, TEXAS
CABALLOS CREEK QUADRANGLE
SHEET NUMBER 04 OF 30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98°29'30"W
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98°25'0"W
98°24'30"W
98°24'0"W
98°23'30"W
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98°22'30"W
28°45'0"N
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28°44'0"N
28°43'30"N
28°43'0"N
28°42'30"N
28°42'0"N
28°41'30"N
28°41'0"N
28°40'30"N
28°40'0"N
28°39'30"N
28°39'0"N
28°38'30"N
28°38'0"N
28°37'30"N
ATASCOSA COUNTY
ATASCOSA COUNTY
Salt Branch
Mustang Branch
Branch
CoB
PIT
FaC
EvC
DsB
LaB
W
ImB
BrB
MwA
MtB
CVB
CbB
McC
WgC
WPD
VeC

Joins sheet 3, Cross NE

Joins sheet 5, Whitsett

Joins sheet 8, Cross

Joins sheet 9, Crowther

Joins sheet 10, Willow Hollow Tank

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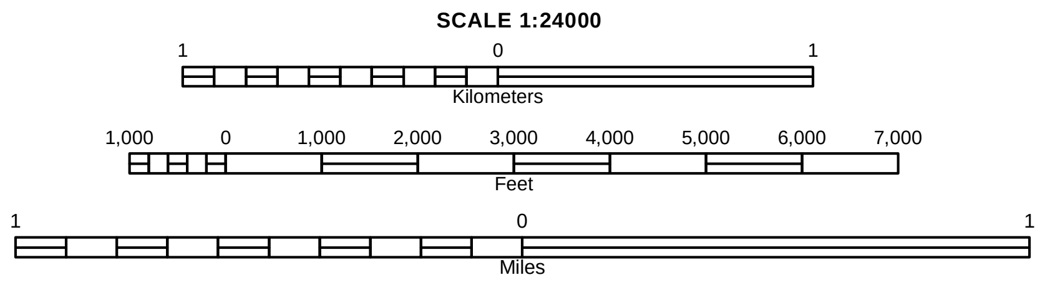
North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 13. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.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Feet
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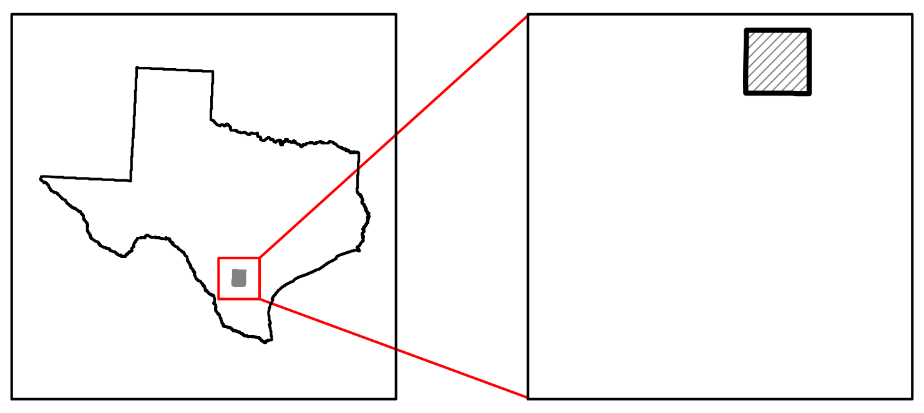
1
Miles


MCMULLEN COUNTY LOCATION
QUADRANGLE LOCATION

CABALLOS CREEK, TEXAS

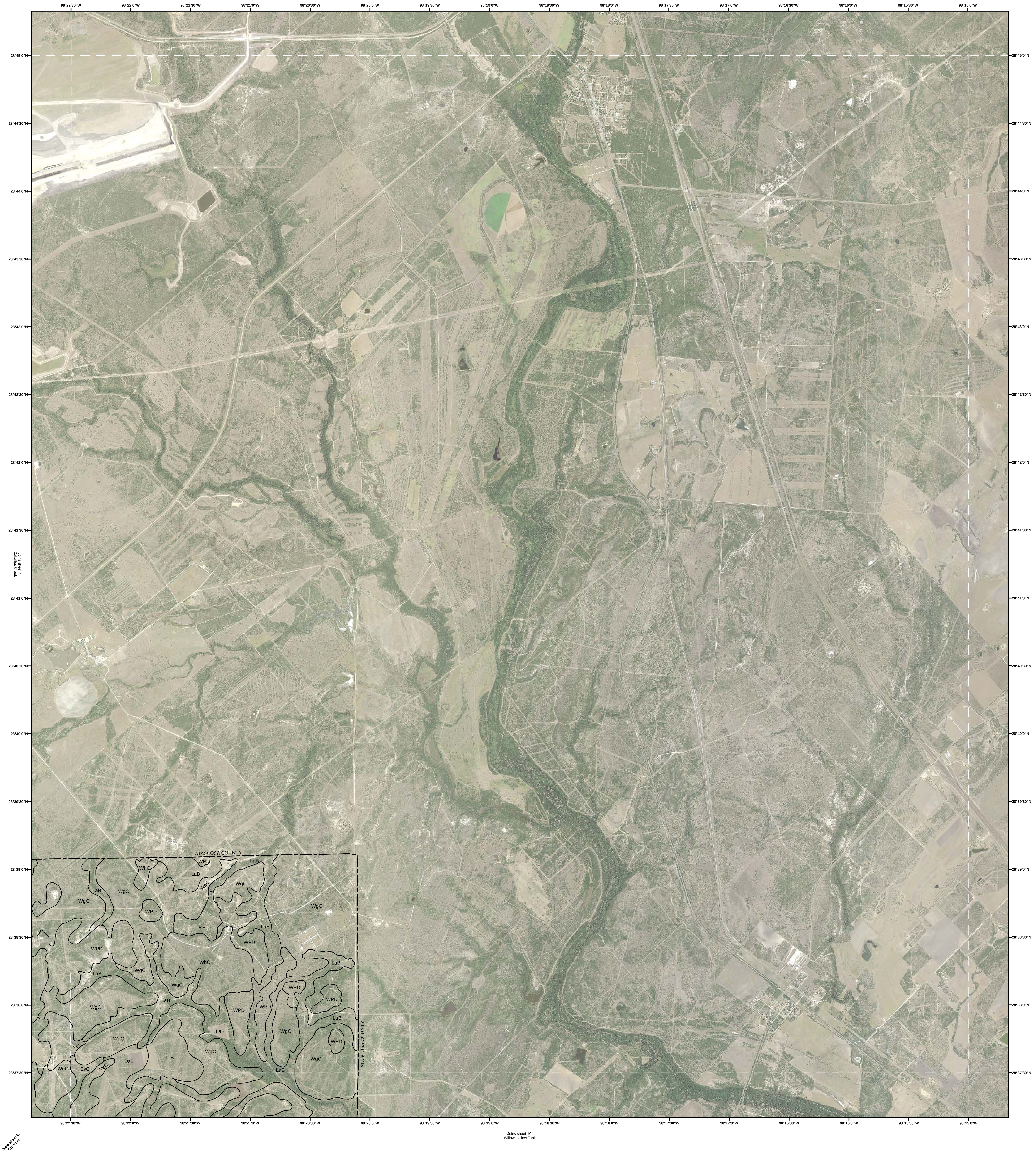
7.5 MINUTE SERIES

SHEET NUMBER 04 OF 30

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MCMULLEN COUNTY, TEXAS
WHITSETT QUADRANGLE
SHEET NUMBER 05 OF 30



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28°39'30"N
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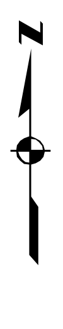
28°38'30"N
28°38'0"N
28°37'30"N
Joins sheet 4,
Caballos Creek
ATASCOSA COUNTY
WhC
WPD
LaB
LaB
WgC
LaB
WgC
WgC
WgC
WPD
DsB
LaB
WgC
WPD
WPD
WhC
LaB
WgC
LaB
WgC
WPD
LaB
WPD
WgC
WPD
WPD
LaB
WgC
LaB
WPD
WgC
VeC
WgC
DsB
ToB
WgC
WgC
EvC
VeC
LaB
ATASCOSA COUNTY
Joins sheet 10,
Willow Hollow Tank
Joins sheet 9,
Crowther

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service, from 2008 National Agriculture Imagery Program (NAIP) photography. Hydrography and cultural layers were acquired from U.S. Department of Agriculture, Natural Resources Conservation Service. The hydrography and cultural layers were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 13. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



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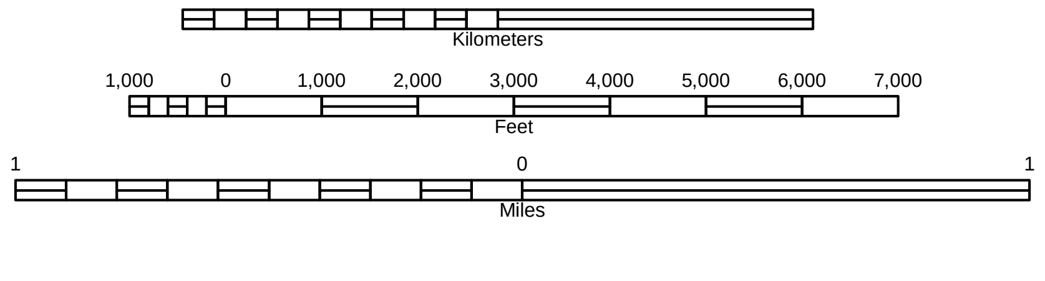

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Kilometers
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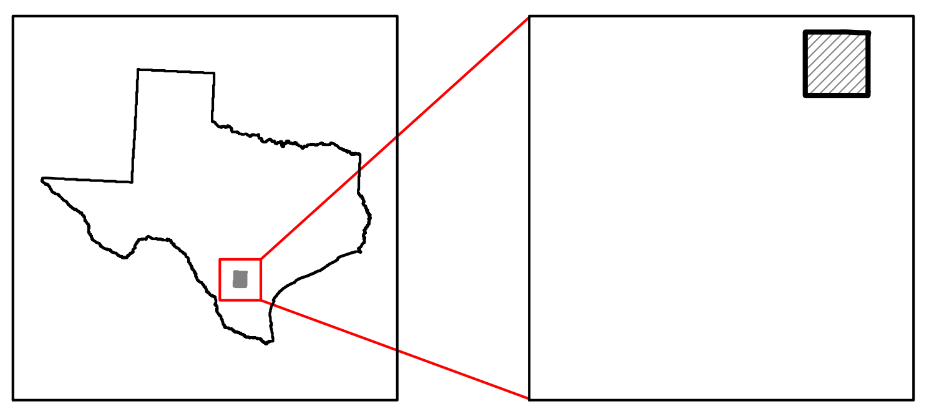
Miles



MCMULLEN COUNTY LOCATION

QUADRANGLE LOCATION

WHITSETT, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 05 OF 30

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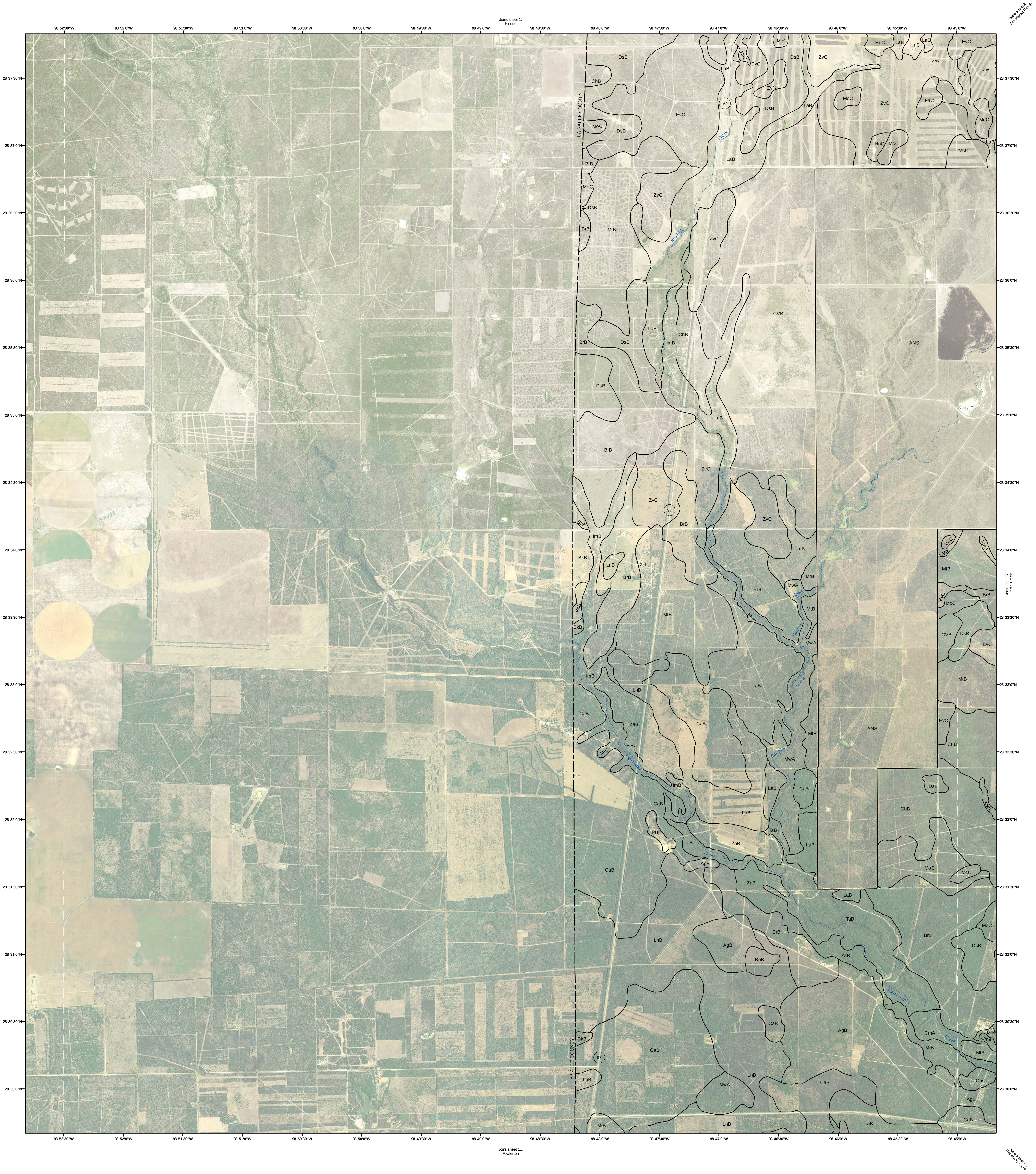
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MCMULLEN COUNTY, TEXAS
ZELLA QUADRANGLE
SHEET NUMBER 06 OF 30



Joins sheet 1,
Hindes
Joins sheet 2,
San Miguel Ranch
Joins sheet 7,
Pertle Creek
Joins sheet 11,
Fowlerton
Joins sheet 12,
Rockaway Creek
98 52'30"W
98 52'0"W
98 51'30"W
98 51'0"W
98 50'30"W
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LA SALLE COUNTY
Zella
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Creek
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ChB
MoC
BrB
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ZvC
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CVB
ANS
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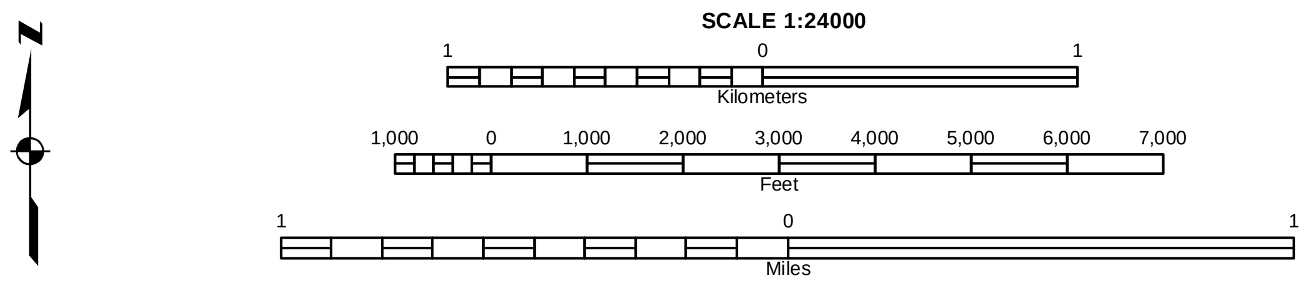
CuB



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Kilometers
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Feet
1
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1
Miles

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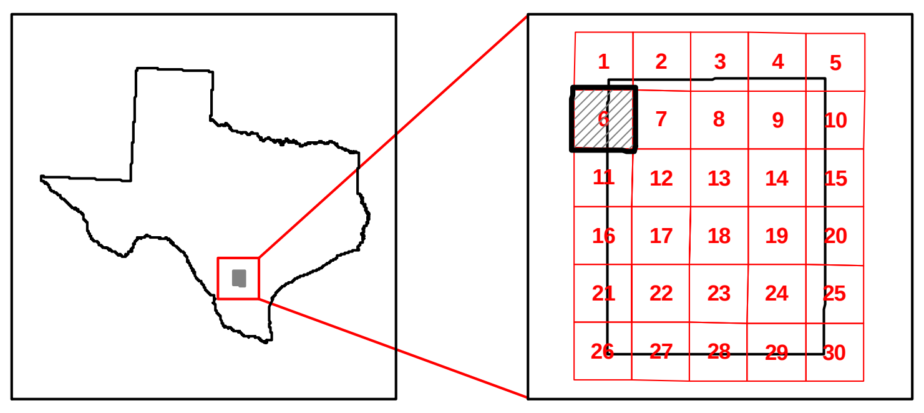
North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 13. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



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MCMULLEN COUNTY LOCATION

QUADRANGLE LOCATION

ZELLA, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 06 OF 30

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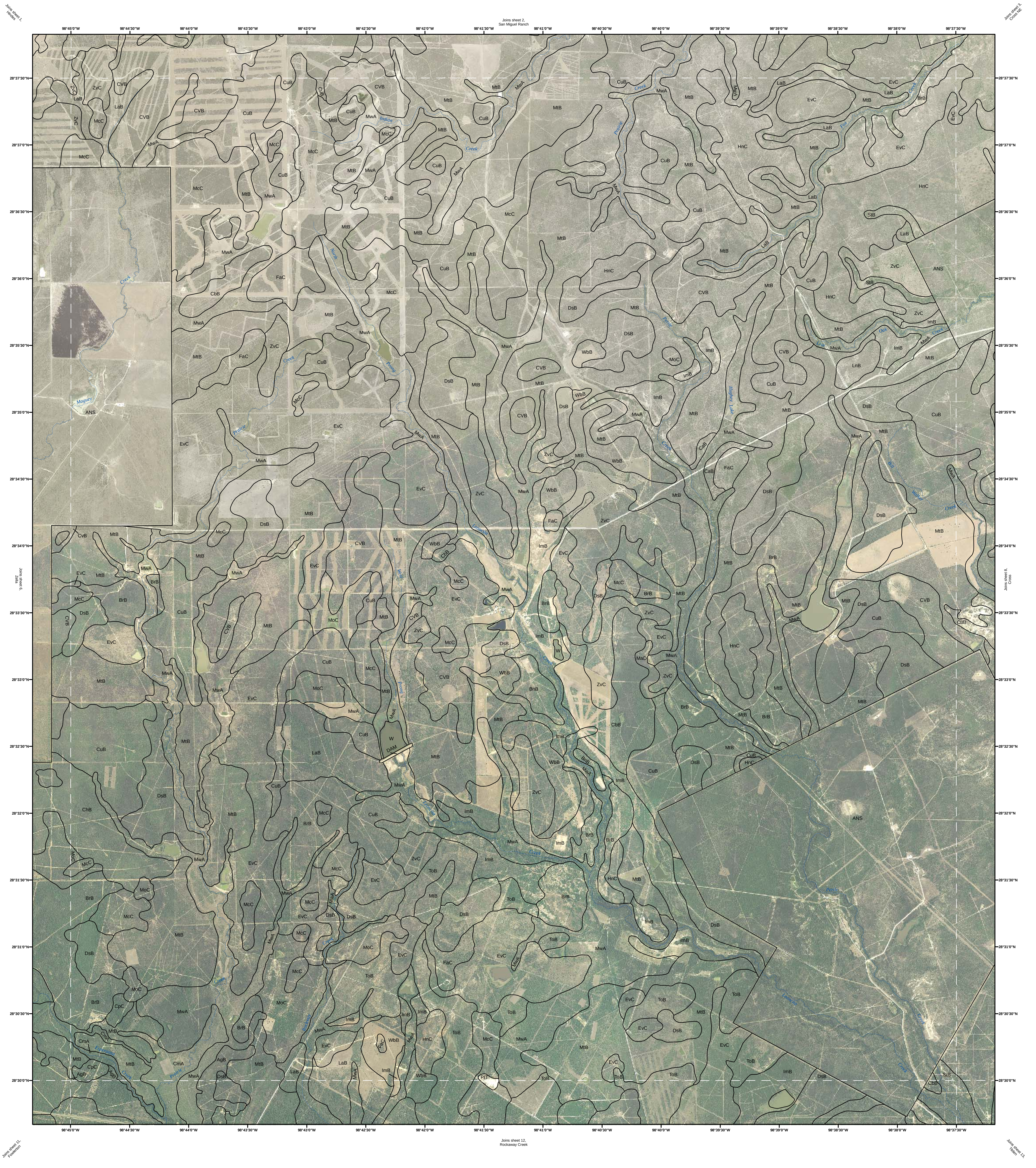
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MCMULLEN COUNTY, TEXAS
PERTLE CREEK QUADRANGLE
SHEET NUMBER 07 OF 30


Joins sheet 1, Hindes
Joins sheet 2, San Miguel Ranch
Joins sheet 3, Cross NE
Joins sheet 6, Zella
Joins sheet 8, Cross
Joins sheet 11, Fowlerton
Joins sheet 12, Rockaway Creek
Joins sheet 13, Tilden
98°45'0"W
98°44'30"W
98°44'0"W
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98°43'0"W
98°42'30"W
98°42'0"W
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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 13. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

N

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Kilometers

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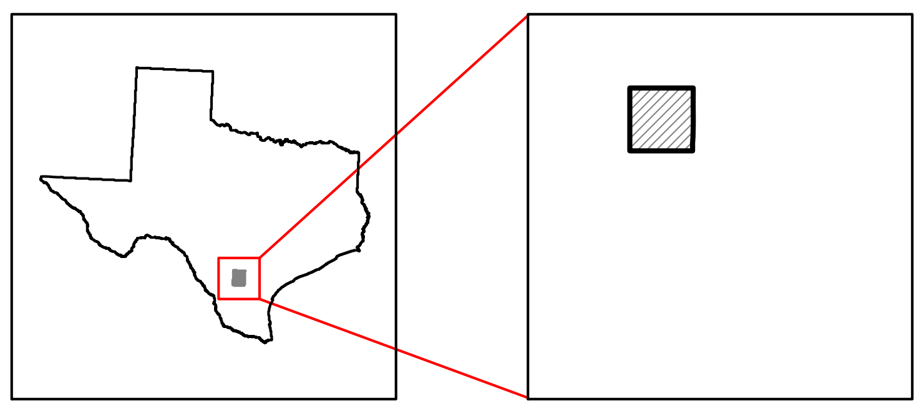
Feet

1 0 1
Miles



MCMULLEN COUNTY LOCATION

QUADRANGLE LOCATION

PERTLE CREEK, TEXAS

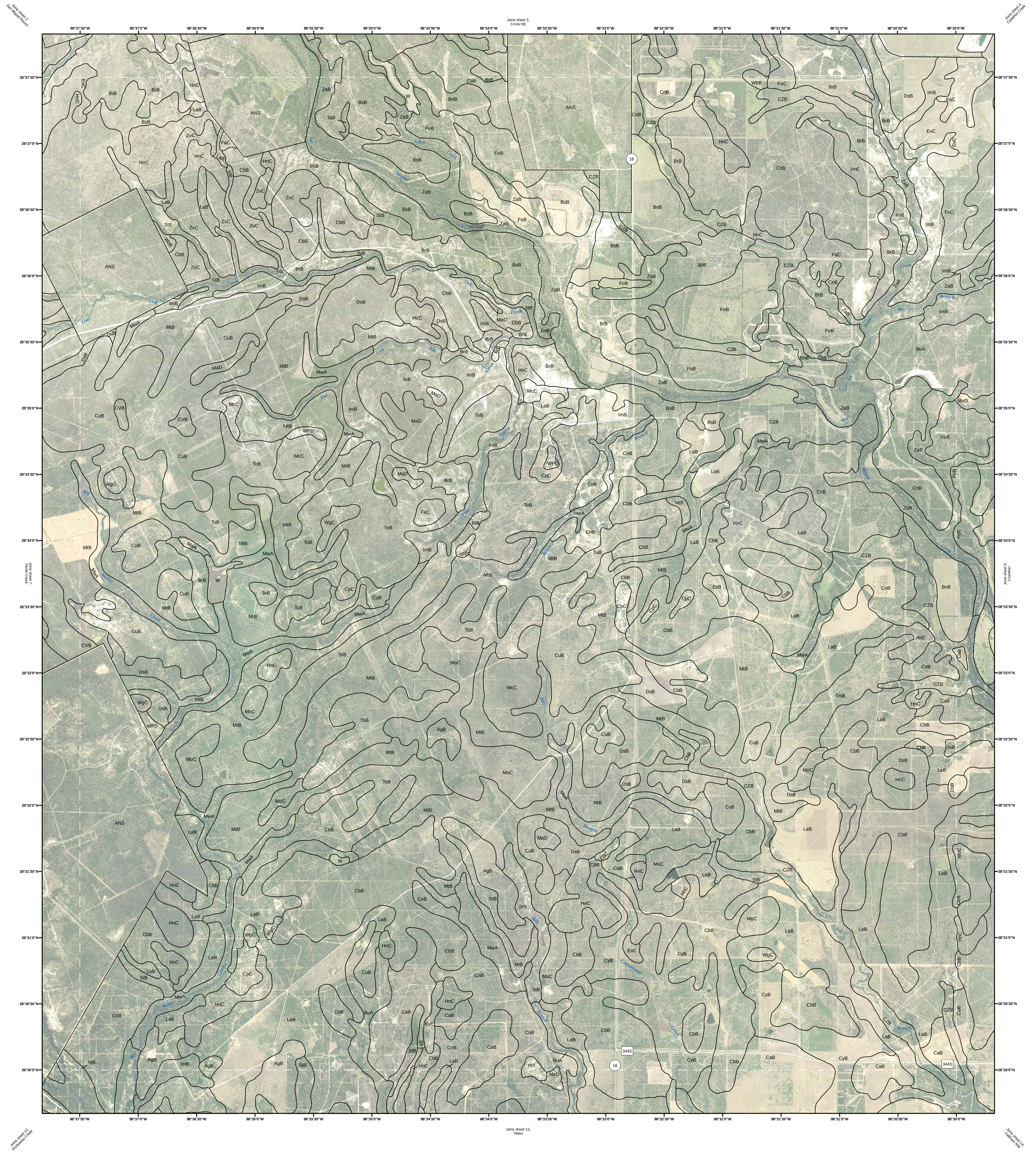
7.5 MINUTE SERIES

SHEET NUMBER 07 OF 30

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MCMULLEN COUNTY, TEXAS
CROSS QUADRANGLE
SHEET NUMBER 08 OF 30


Joins sheet 2, San Miguel Ranch
Joins sheet 3, Cross NE
Joins sheet 4, Caballos Creek
Joins sheet 7, Pertle Creek
Joins sheet 9, Crowther
Joins sheet 12, Rockaway Creek
Joins sheet 13, Tilden
Joins sheet 14, Calliham NW
98°37'30"W
98°37'0"W
98°36'30"W
98°36'0"W
98°35'30"W
98°35'0"W
98°34'30"W
98°34'0"W
98°33'30"W
98°33'0"W
98°32'30"W
98°32'0"W
98°31'30"W
98°31'0"W
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16
3445

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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 13. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

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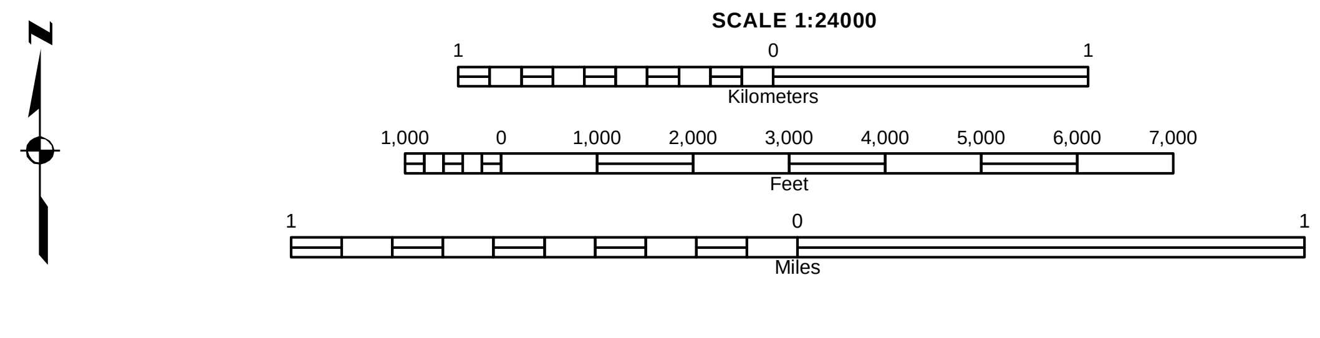
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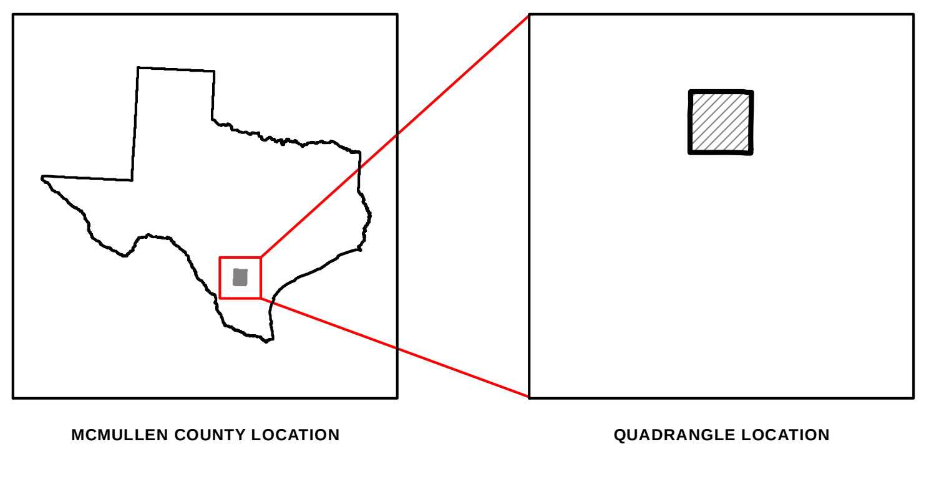


MCMULLEN COUNTY LOCATION

QUADRANGLE LOCATION

CROSS, TEXAS

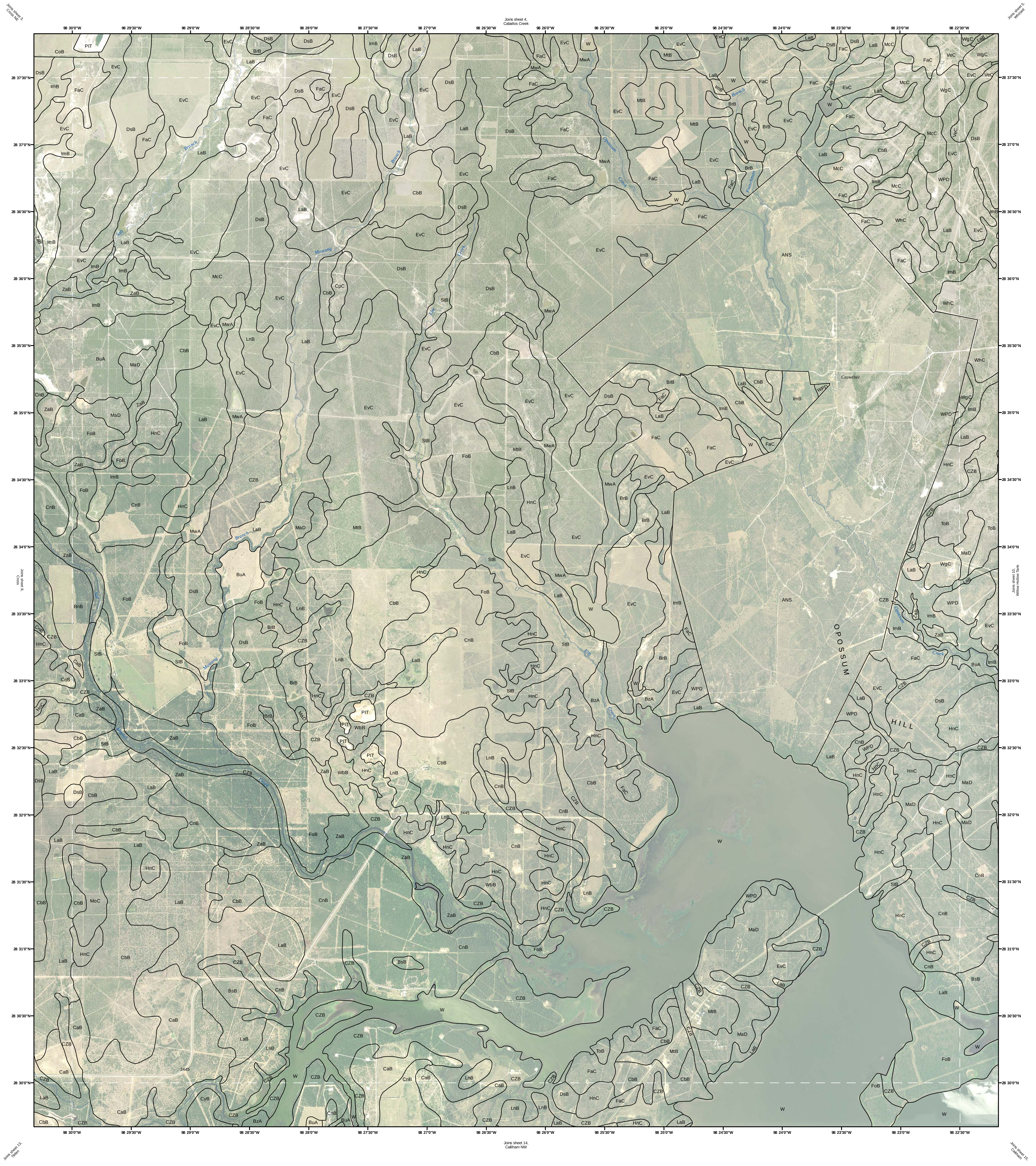
7.5 MINUTE SERIES

SHEET NUMBER 08 OF 30

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MCMULLEN COUNTY, TEXAS
CROWTHER QUADRANGLE
SHEET NUMBER 09 OF 30



Joins sheet 3, Cross NE
Joins sheet 4, Caballos Creek
Joins sheet 5, Whitsett
Joins sheet 8, Cross
Joins sheet 10, Willow Hollow Tank
Joins sheet 13, Tilden
Joins sheet 14, Calliham NW
Joins sheet 15, Calliham
98 30'0"W
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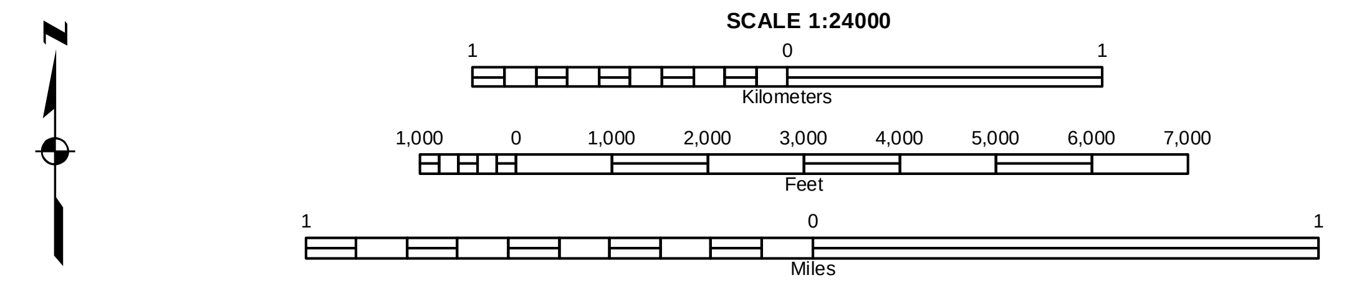
Crowther
OPOSSUM
HILL
Opossum Creek
Mustang Branch
3445

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service, from 2008 National Agriculture Imagery Program (NAIP) photography. Hydrography and cultural layers were acquired from U.S. Department of Agriculture, Natural Resources Conservation Service. The hydrography and cultural layers were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 13.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



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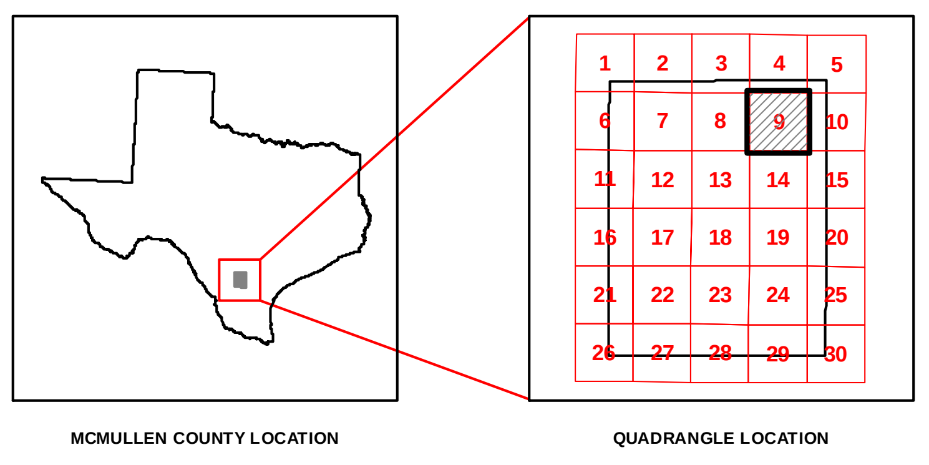

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MCMULLEN COUNTY LOCATION

QUADRANGLE LOCATION

CROWTHER, TEXAS

7.5 MINUTE SERIES

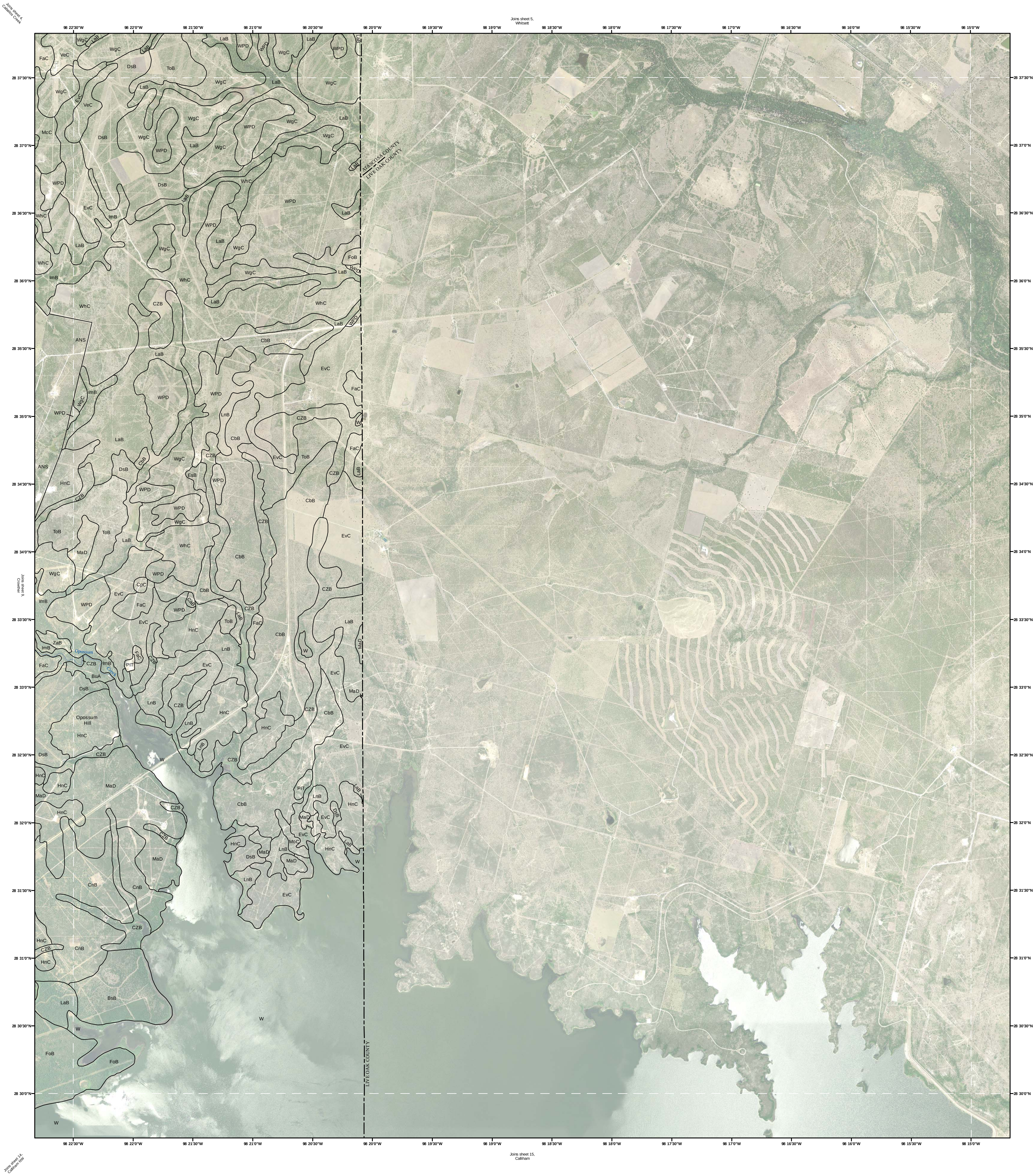
SHEET NUMBER 09 OF 30

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MCMULLEN COUNTY, TEXAS
WILLOW HOLLOW TANK QUADRANGLE
SHEET NUMBER 10 OF 30

Joins sheet 4,
Caballos Creek



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Whitsett
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28 37'0"N
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28 30'0"N
Joins sheet 9,
Crowther
ATASCOSA COUNTY
LIVE OAK COUNTY
LIVE OAK COUNTY
Opossum
Creek
Opossum
Hill
FaC
VeC
WgC
LaB
WPD
DsB
ToB
EvC
McC
WhC
ImB
CZB
ANS
CbB
FoB
LnB
HnC
CpC
MaD
ZaB
BuA
PIT
EsB
CnB
BsB
Mo
W
Joins sheet 15,
Calliham

Joins sheet 14,
Calliham NW

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service, from 2008 National Agriculture Imagery Program (NAIP) photography. Hydrography and cultural layers were acquired from U.S. Department of Agriculture, Natural Resources Conservation Service. The hydrography and cultural layers were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 13. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

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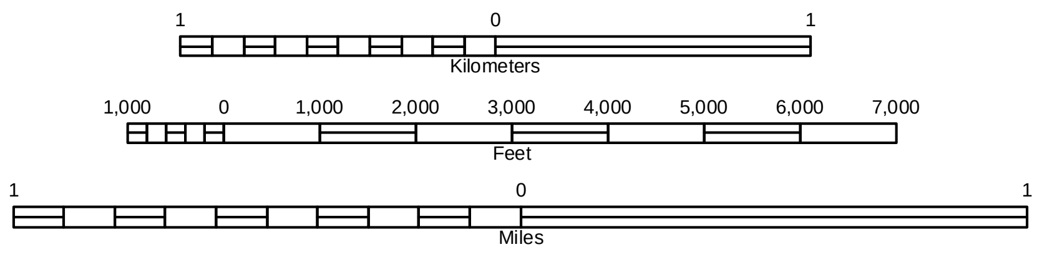

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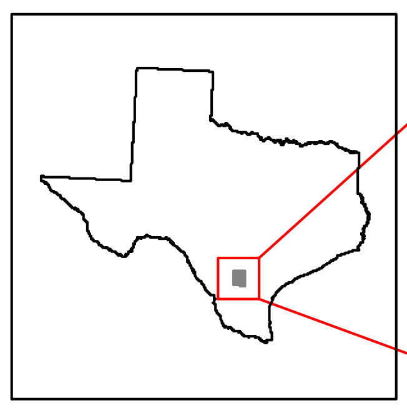
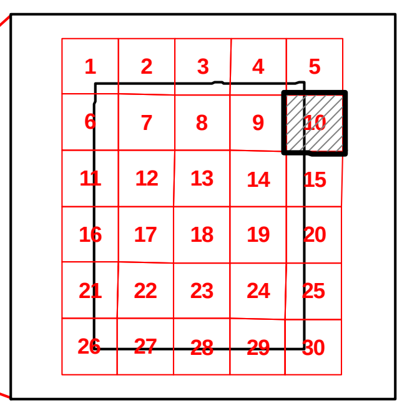


MCMULLEN COUNTY LOCATION



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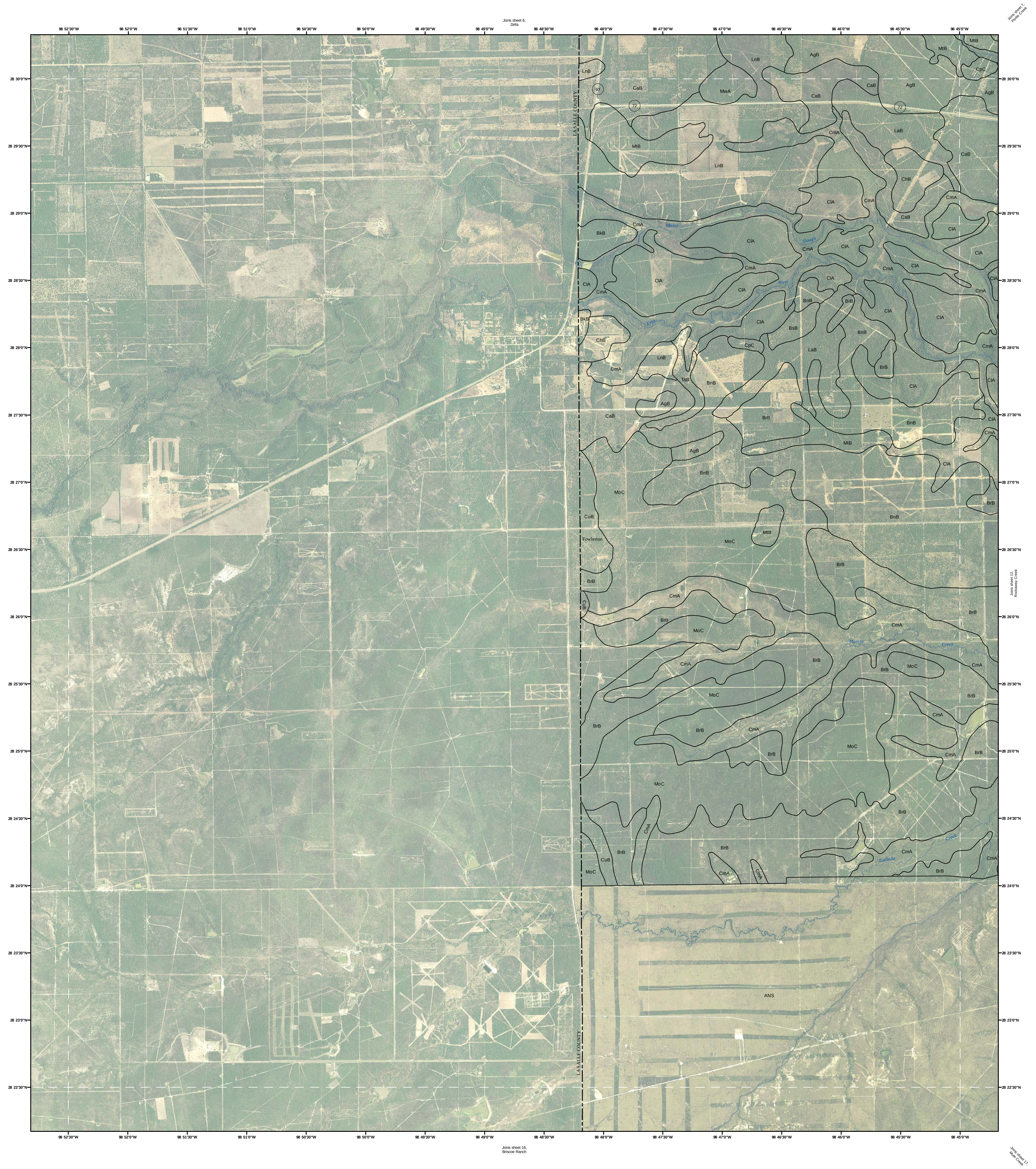
QUADRANGLE LOCATION

WILLOW HOLLOW TANK, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 10 OF 30

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MCMULLEN COUNTY, TEXAS
FOWLERTON QUADRANGLE
SHEET NUMBER 11 OF 30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Joins sheet 7, Pedro Creek
Joins sheet 12, Rockaway Creek
Joins sheet 16, Briscoe Ranch
Joins sheet 17, Mule Creek
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98 51'30"W
98 51'0"W
98 50'30"W
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98 49'30"W
98 49'0"W
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LA SALLE COUNTY
Fowlerton
Mossy Slough
Frio River
Martin Creek
Gotlindo Creek
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LnB
MtB
AgB
CaB
MwA
CpC
CmA
ChB
ClA
BkB
CpC
BnB
BrB
BsB
LaB
TaB
MoC
CuB
ANS

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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 13. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

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Feet

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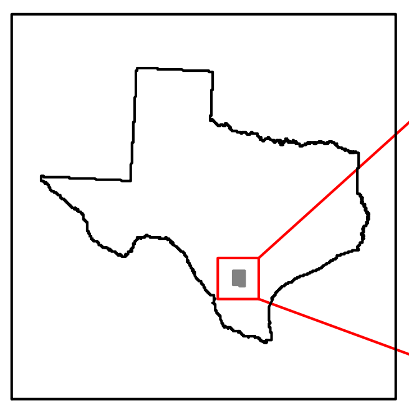
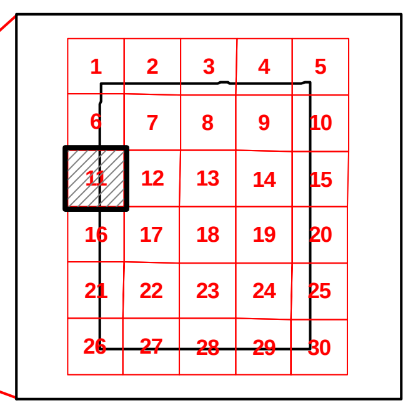

MCMULLEN COUNTY LOCATION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QUADRANGLE LOCATION

FOWLERTON, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 11 OF 30

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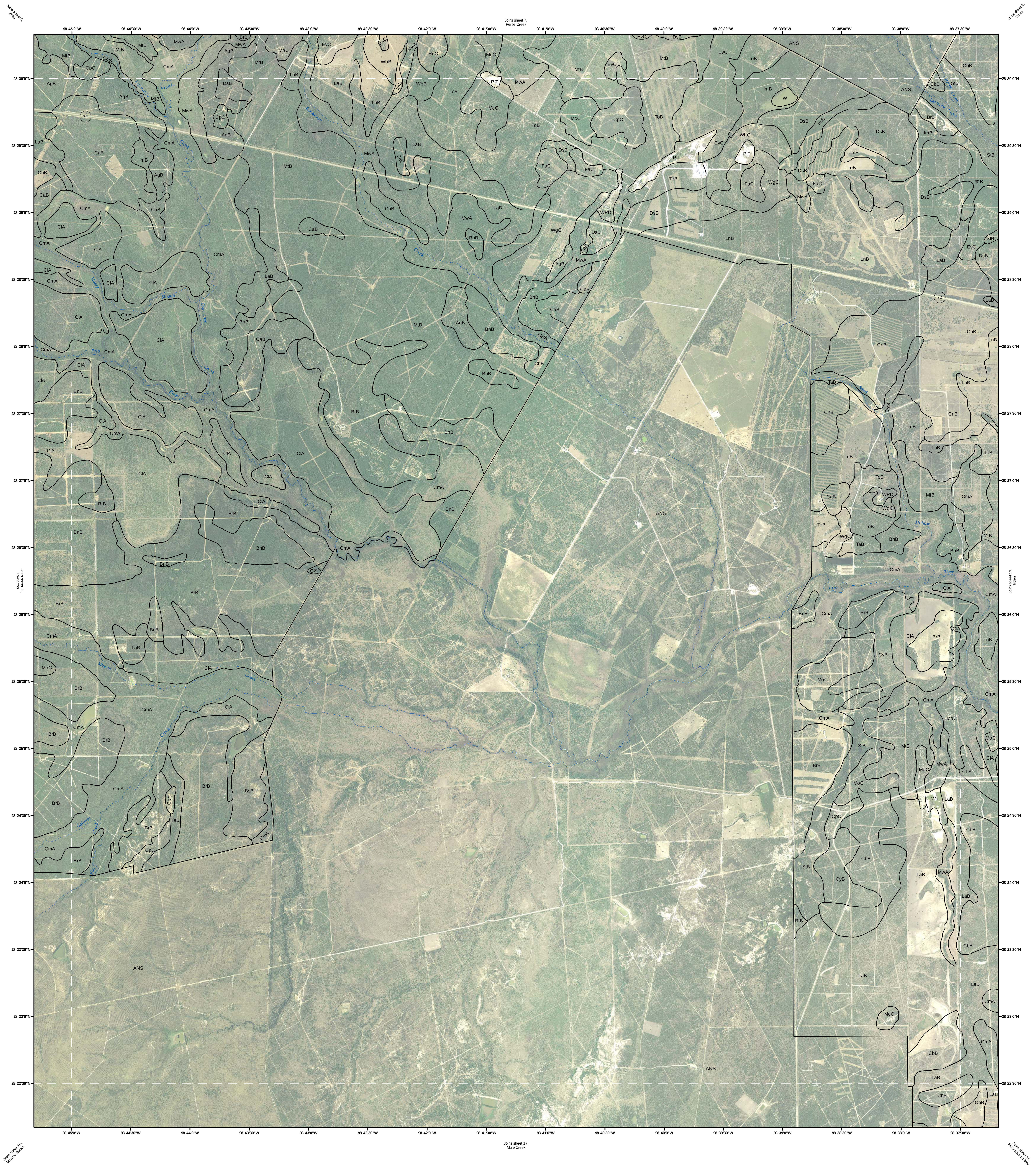
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MCMULLEN COUNTY, TEXAS
ROCKAWAY CREEK QUADRANGLE
SHEET NUMBER 12 OF 30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Cross
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Tilden
Joins sheet 16,
Briscoe Ranch
Joins sheet 17,
Mule Creek
Joins sheet 18,
Fitzpatrick Hollow
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ANS
72

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service, from 2008 National Agriculture Imagery Program (NAIP) photography. Hydrography and cultural layers were acquired from U.S. Department of Agriculture, Natural Resources Conservation Service. The hydrography and cultural layers were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

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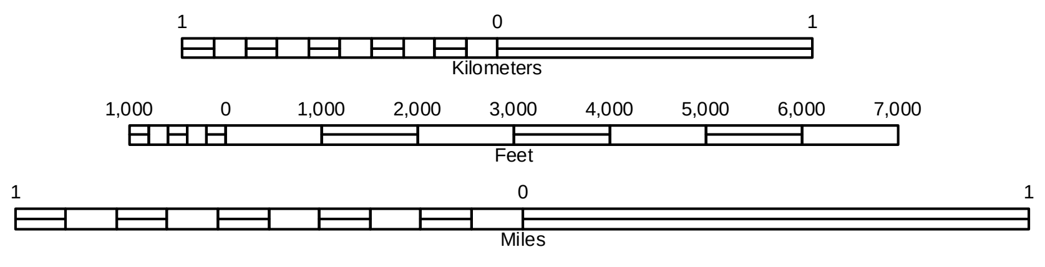
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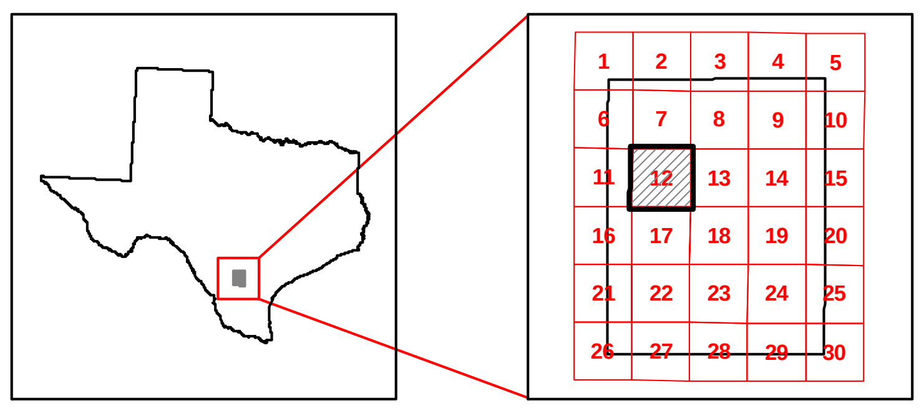
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MCMULLEN COUNTY LOCATION

QUADRANGLE LOCATION

ROCKAWAY CREEK, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 12 OF 30

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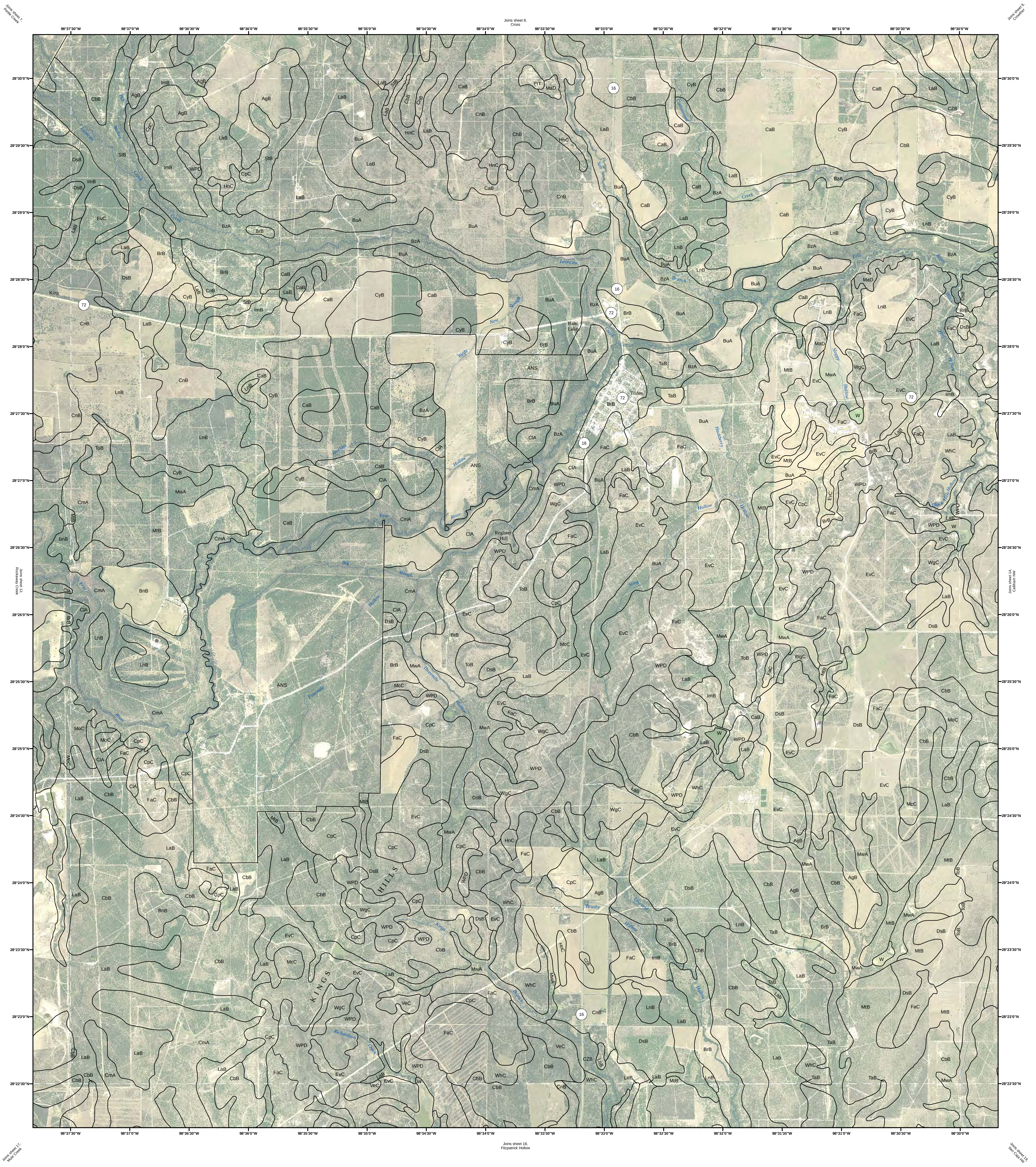
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MCMULLEN COUNTY, TEXAS
TILDEN QUADRANGLE
SHEET NUMBER 13 OF 30



Joins sheet 7, Pertle Creek
Joins sheet 8, Cross
Joins sheet 9, Crowther
Joins sheet 12, Rockaway Creek
Joins sheet 14, Calliham NW
Joins sheet 17, Mule Creek
Joins sheet 18, Fitzpatrick Hollow
Joins sheet 19, San Caja Hill
98°37'30"W
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28°22'30"N
Tilden
Register Hill
Hahs Lake
KINGS HILLS
King
Leoncita Creek
Big Slough
Frio River
Salt Branch
Brushy Hollow
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This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service, from 2008 National Agriculture Imagery Program (NAIP) photography. Hydrography and cultural layers were acquired from U.S. Department of Agriculture, Natural Resources Conservation Service. The hydrography and cultural layers were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

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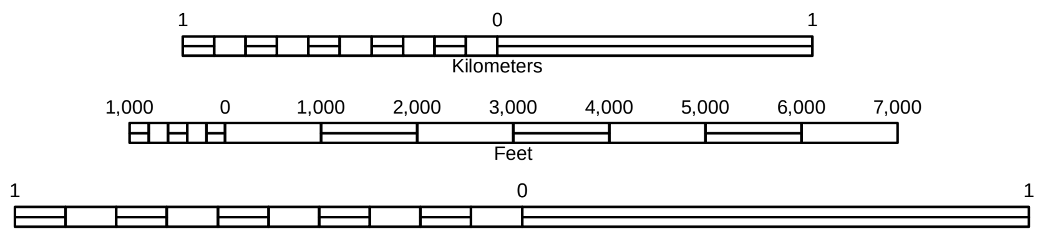

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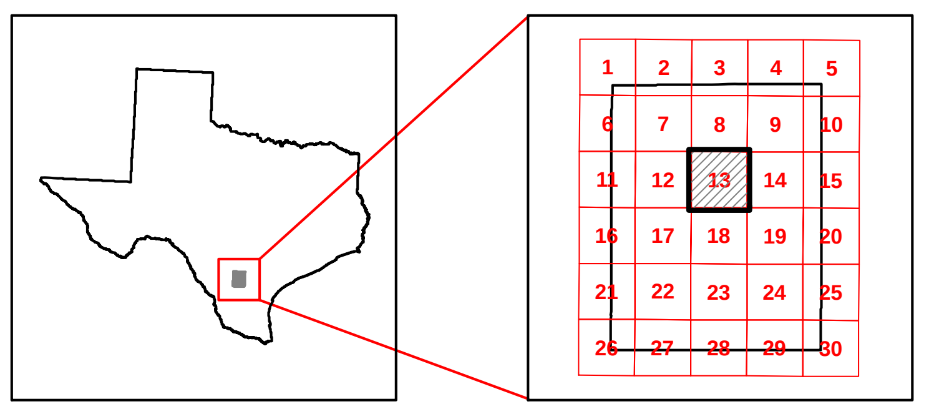

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MCMULLEN COUNTY LOCATION

QUADRANGLE LOCATION

TILDEN, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 13 OF 30

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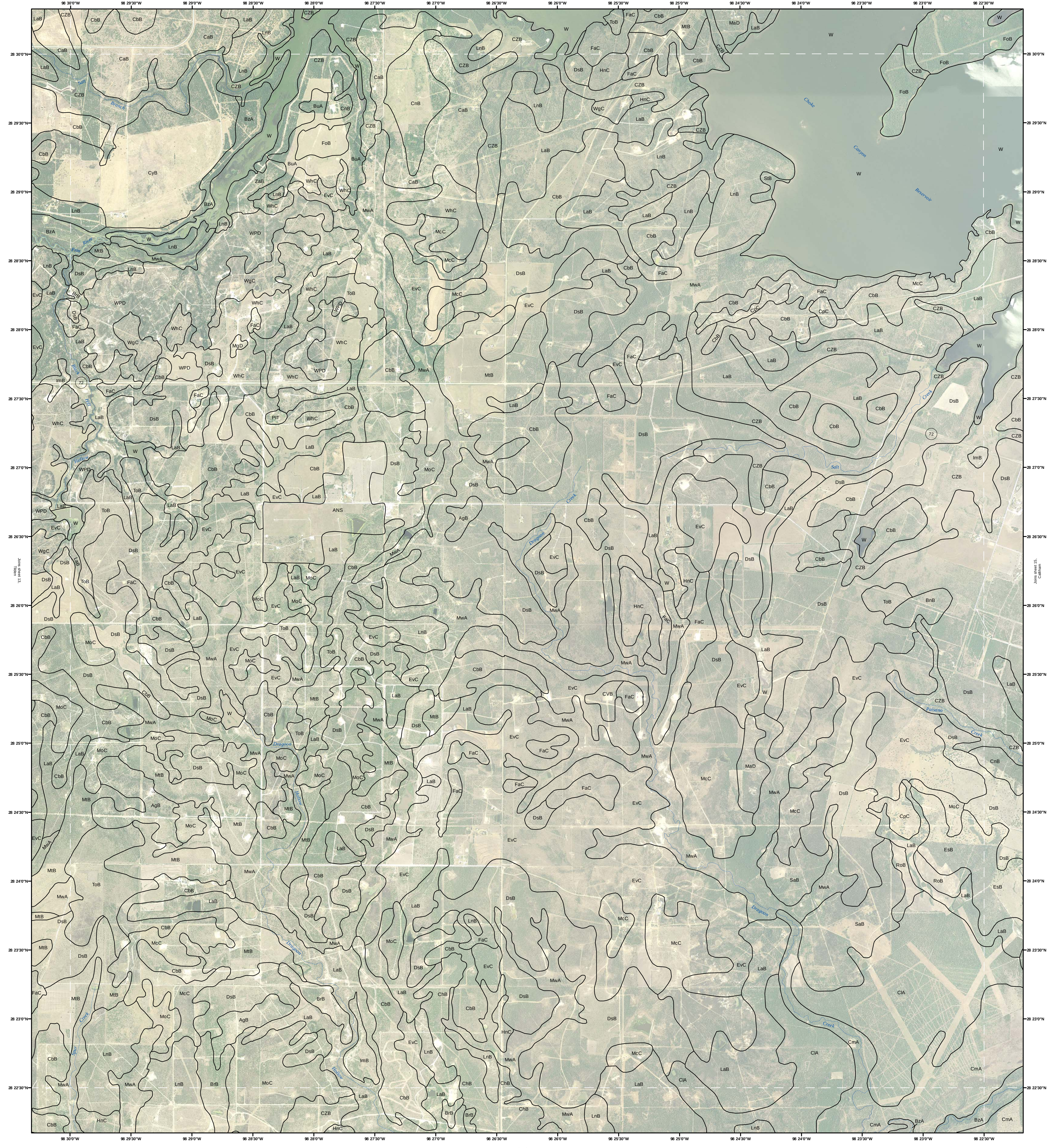
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MCMULLEN COUNTY, TEXAS
CALLIHAM NW QUADRANGLE
SHEET NUMBER 14 OF 30

Joins sheet 8,
Cross

Joins sheet 9,
Crowther

Joins sheet 10,
Willow Hollow Tank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Choke Canyon Reservoir
Salt Creek
Dragoon Creek
Paisano Creek
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Joins sheet 13,
Tilden

Joins sheet 15,
Calliham

Joins sheet 18,
Fitzpatrick Hollow

Joins sheet 19,
San Caja Hill

Joins sheet 20,
Live Oak Hollow

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North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 13.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

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Kilometers

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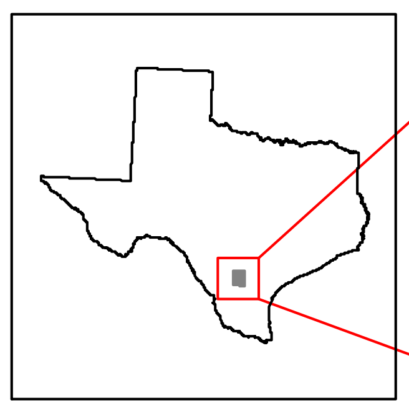
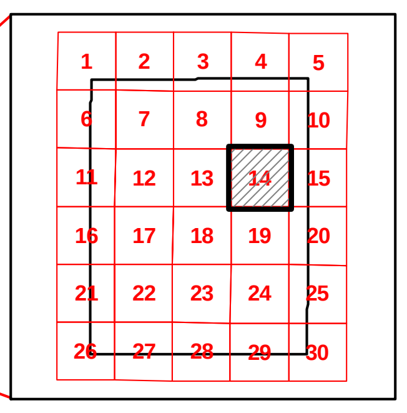


MCMULLEN COUNTY LOCATION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QUADRANGLE LOCATION

CALLIHAM NW, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 14 OF 30

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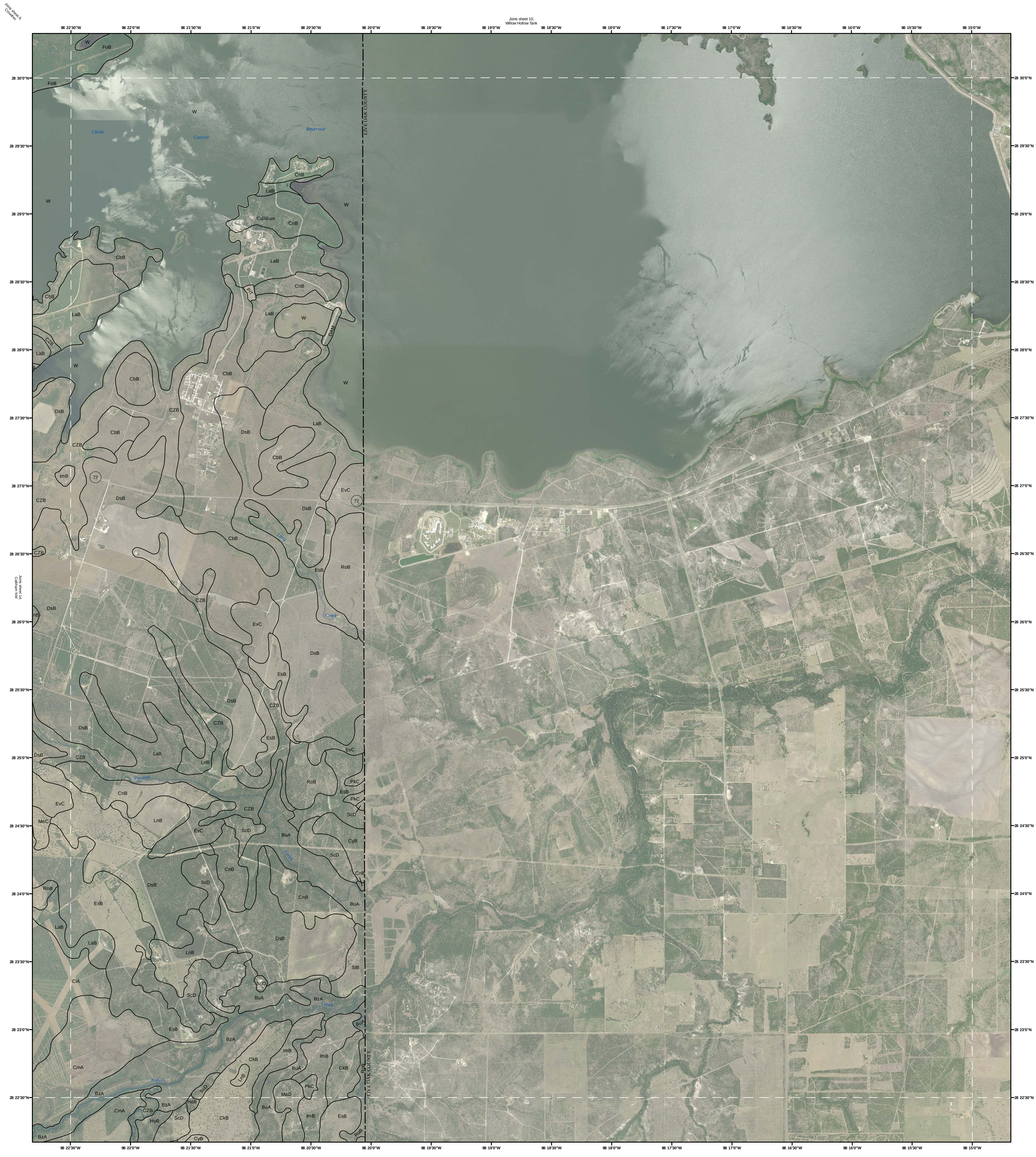
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MCMULLEN COUNTY, TEXAS
CALLIHAM QUADRANGLE
SHEET NUMBER 15 OF 30



Joins sheet 9, Crowther
Joins sheet 10, Willow Hollow Tank
Joins sheet 14, Calliham NW
Joins sheet 19, San Caja Hill
Joins sheet 20, Live Oak Hollow
98 22'30"W
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LIVE OAK COUNTY
Choke
Canyon
Reservoir
Calliham
Creek
Nueces
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W
FoB
CnB
LaB
CbB
CZB
DsB
ImB
EvC
EsB
RoB
LnB
PkC
ScD
CyB
BuA
CnB
MoC
StB
ClA
BzA
CmA
CkB
MaD
HoB

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service, from 2008 National Agriculture Imagery Program (NAIP) photography. Hydrography and cultural layers were acquired from U.S. Department of Agriculture, Natural Resources Conservation Service. The hydrography and cultural layers were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 13. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

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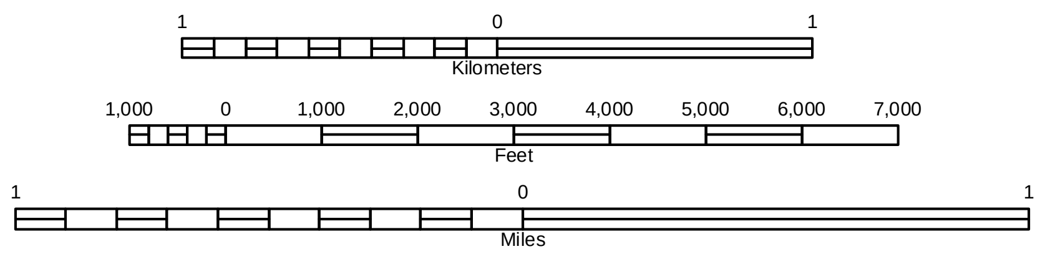

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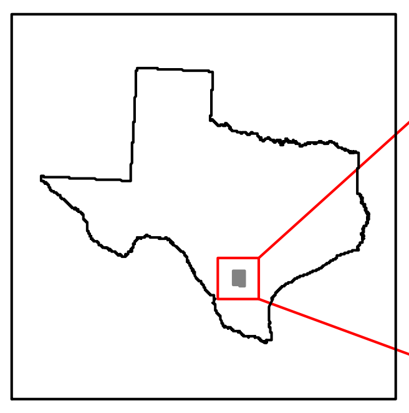
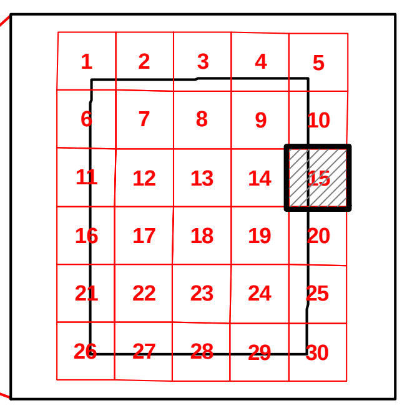

MCMULLEN COUNTY LOCATION



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QUADRANGLE LOCATION

CALLIHAM, TEXAS

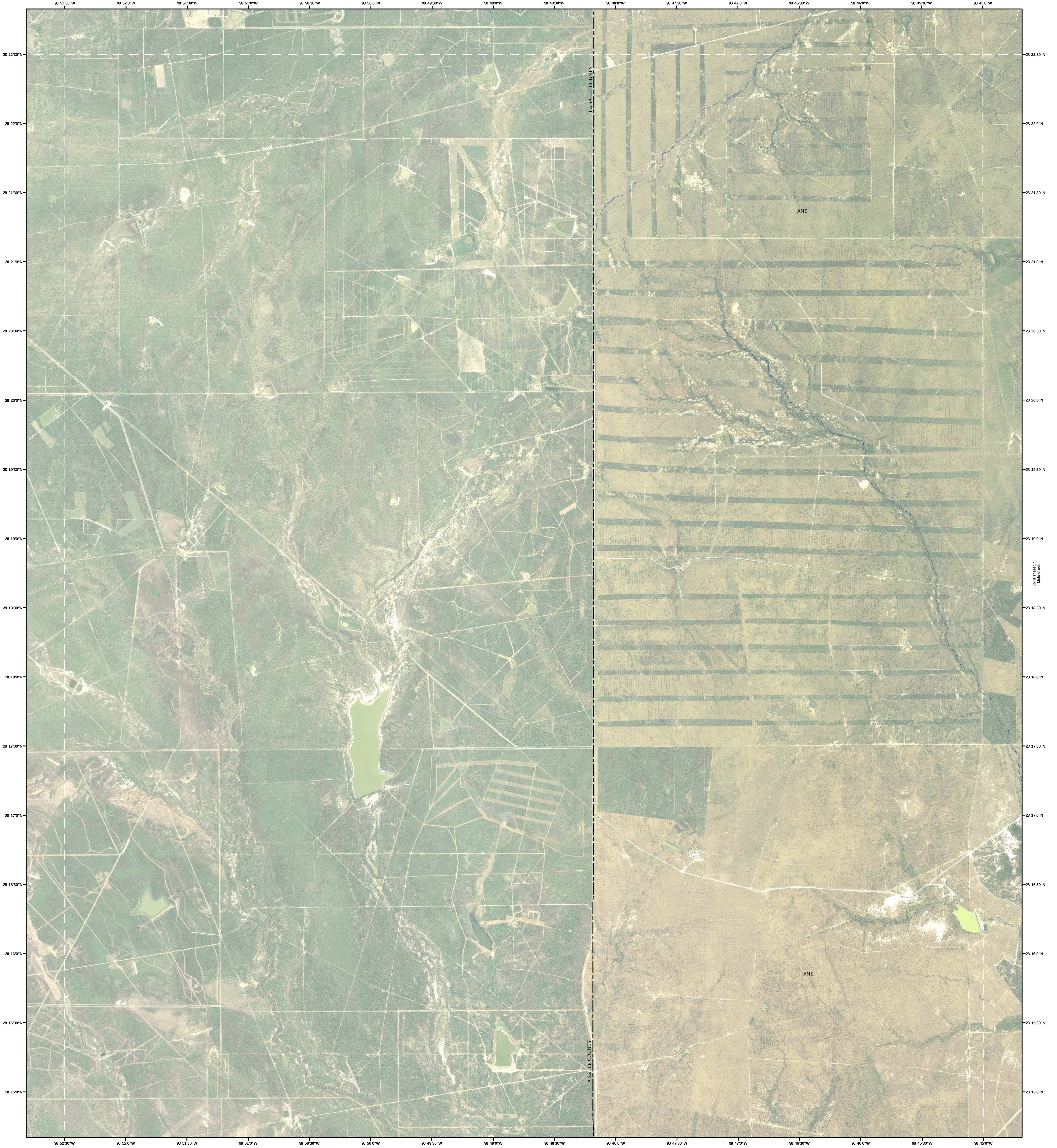
7.5 MINUTE SERIES

SHEET NUMBER 15 OF 30

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MCMULLEN COUNTY, TEXAS
BRISCOE RANCH QUADRANGLE
SHEET NUMBER 16 OF 30


Joins sheet 11,
Fowlerton
Joins sheet 12,
Rockaway Creek
Joins sheet 17,
Mule Creek
98 52'30"W
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28 17'0"N
28 16'30"N
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28 15'30"N
28 15'0"N
LA SALLE COUNTY
ANS
ANS
LA SALLE COUNTY

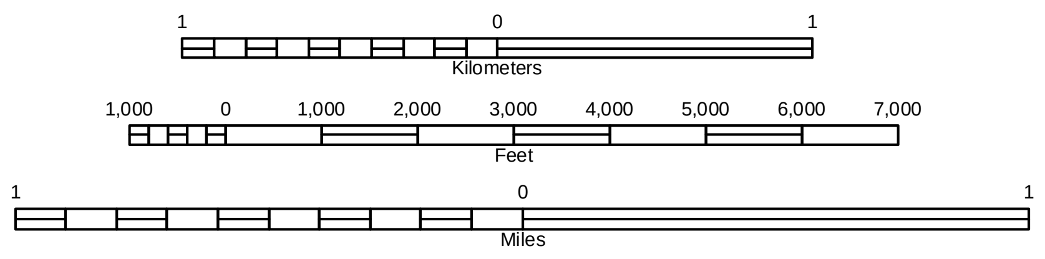
Joins sheet 21,
Piedra Creek NE

Joins sheet 22,
Loma Alta NW

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service, from 2008 National Agriculture Imagery Program (NAIP) photography. Hydrography and cultural layers were acquired from U.S. Department of Agriculture, Natural Resources Conservation Service. The hydrography and cultural layers were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 13. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

SCALE 1:24000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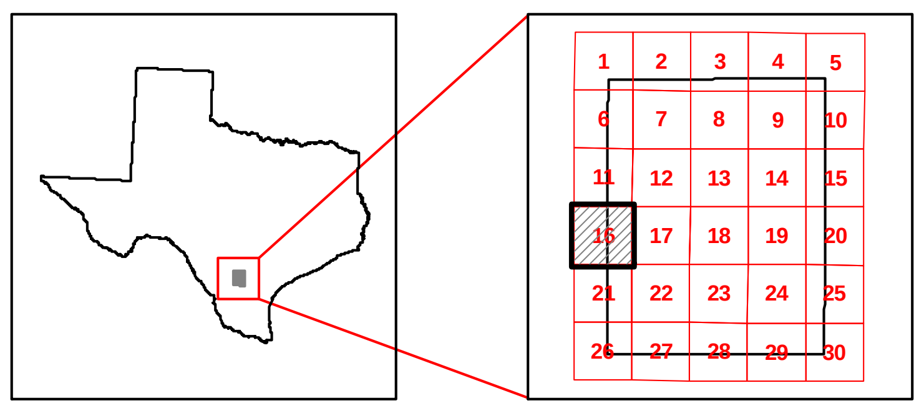
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MCMULLEN COUNTY LOCATION

QUADRANGLE LOCATION

BRISCOE RANCH, TEXAS

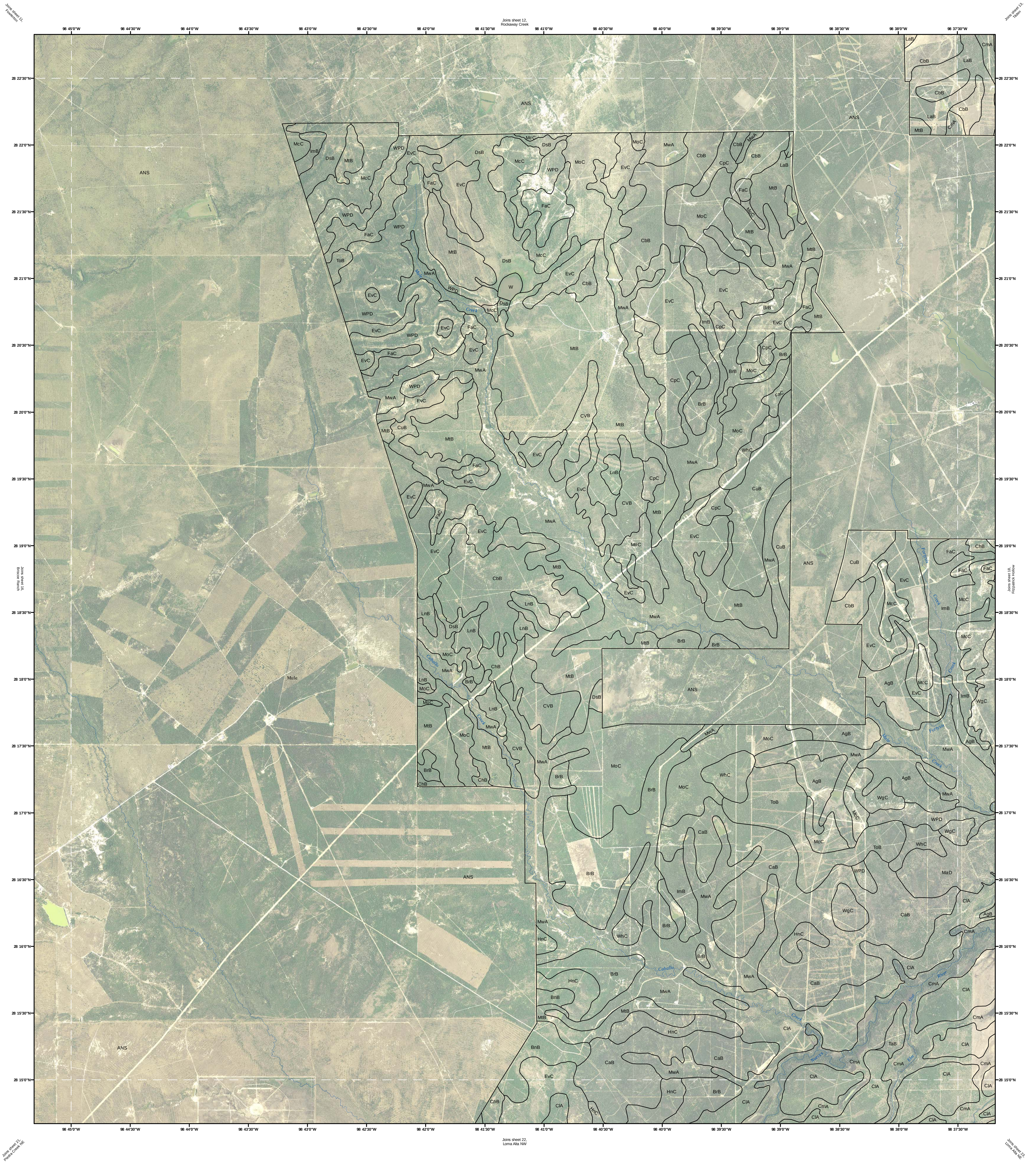
7.5 MINUTE SERIES

SHEET NUMBER 16 OF 30

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MCMULLEN COUNTY, TEXAS
MULE CREEK QUADRANGLE
SHEET NUMBER 17 OF 30


Joins sheet 11, Fowlerton
Joins sheet 12, Rockaway Creek
Joins sheet 13, Tilden
Joins sheet 16, Briscoe Ranch
Joins sheet 18, Fitzpatrick Hollow
Joins sheet 21, Piedra Creek NE
Joins sheet 22, Loma Alta NW
Joins sheet 23, Loma Alta NE
98 45'0"W
98 44'30"W
98 44'0"W
98 43'30"W
98 43'0"W
98 42'30"W
98 42'0"W
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98 41'0"W
98 40'30"W
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98 39'30"W
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98 37'30"W
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ANS
Mule
Mule Creek
Caballo Creek
Fitzpatrick Creek
Frio River
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BnB
BrB
CaB
CbB
ChB
CIA
CmA
CpC
CuB
CVB
DsB
EvC
FaC
HnC
ImB
LaB
LnB
MaD
McC
MoC
MtB
MwA
TaB
ToB
W
WgC
WhC
WPD

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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 13. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

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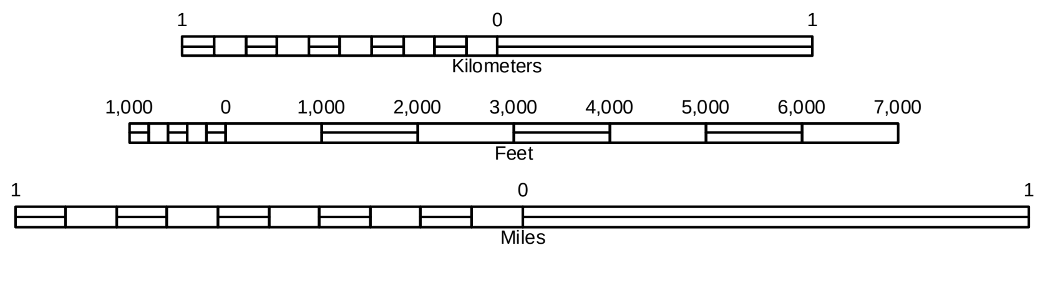
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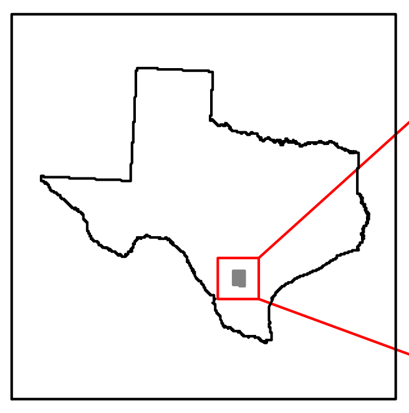
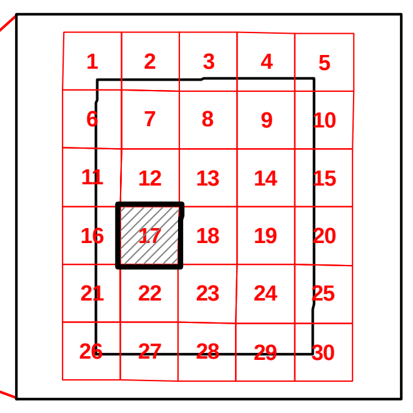


MCMULLEN COUNTY LOCATION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QUADRANGLE LOCATION

MULE CREEK, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 17 OF 30

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

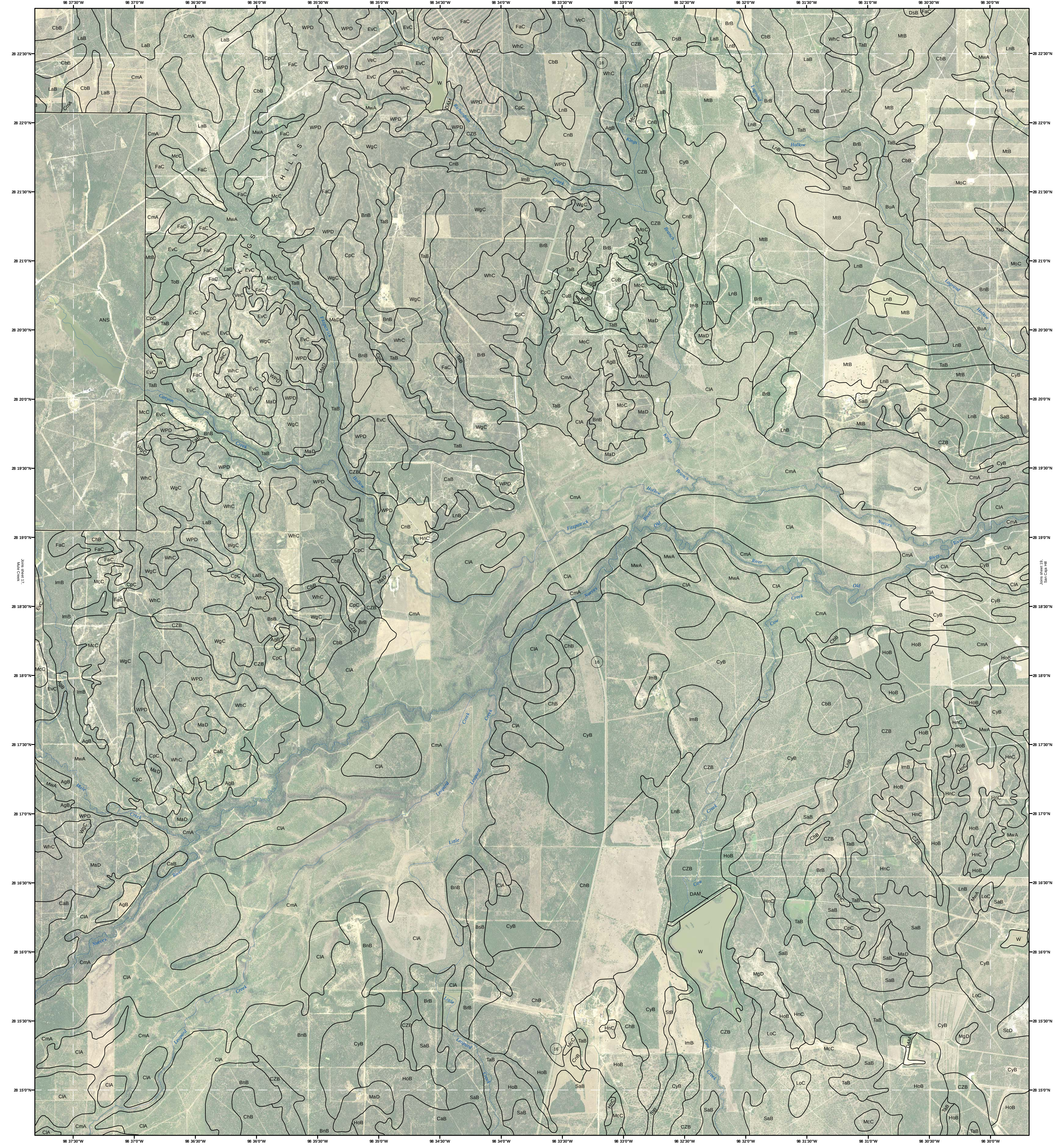
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MCMULLEN COUNTY, TEXAS
FITZPATRICK HOLLOW QUADRANGLE
SHEET NUMBER 18 OF 30

Joins sheet 12,
Rockaway Creek

Joins sheet 13,
Tilden

Joins sheet 14,
Calliham NW



98 37'30"W
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Joins sheet 17, Mule Creek
Joins sheet 19, San Caja Hill
K I N G S H I L L S
Kings Creek
Leoncita Creek
Fitzpatrick Hollow
Nueces River
Old River
Cow Creek
Little Leoncita Creek
Hollow
DAM
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16

Joins sheet 22,
Loma Alta NW

Joins sheet 23,
Loma Alta NE

Joins sheet 24,
La Chusa Hill

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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 13. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

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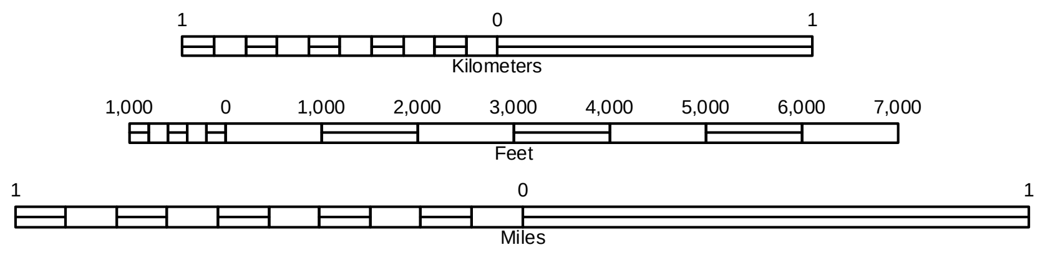

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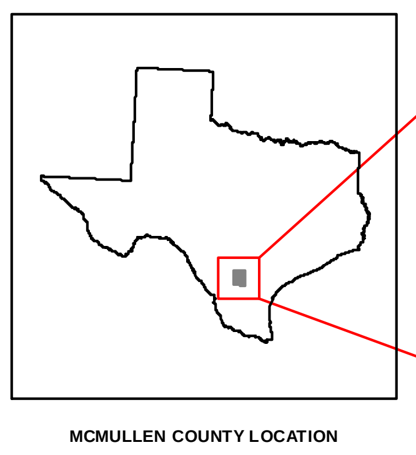
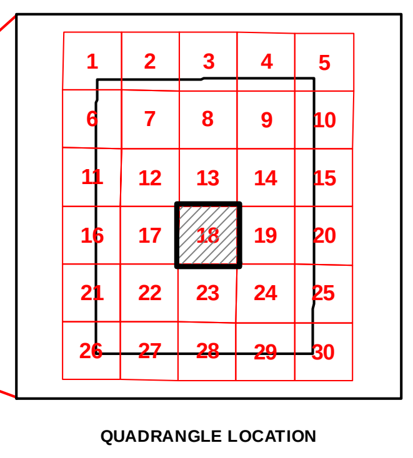


MCMULLEN COUNTY LOCATION



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QUADRANGLE LOCATION

FITZPATRICK HOLLOW, TEXAS

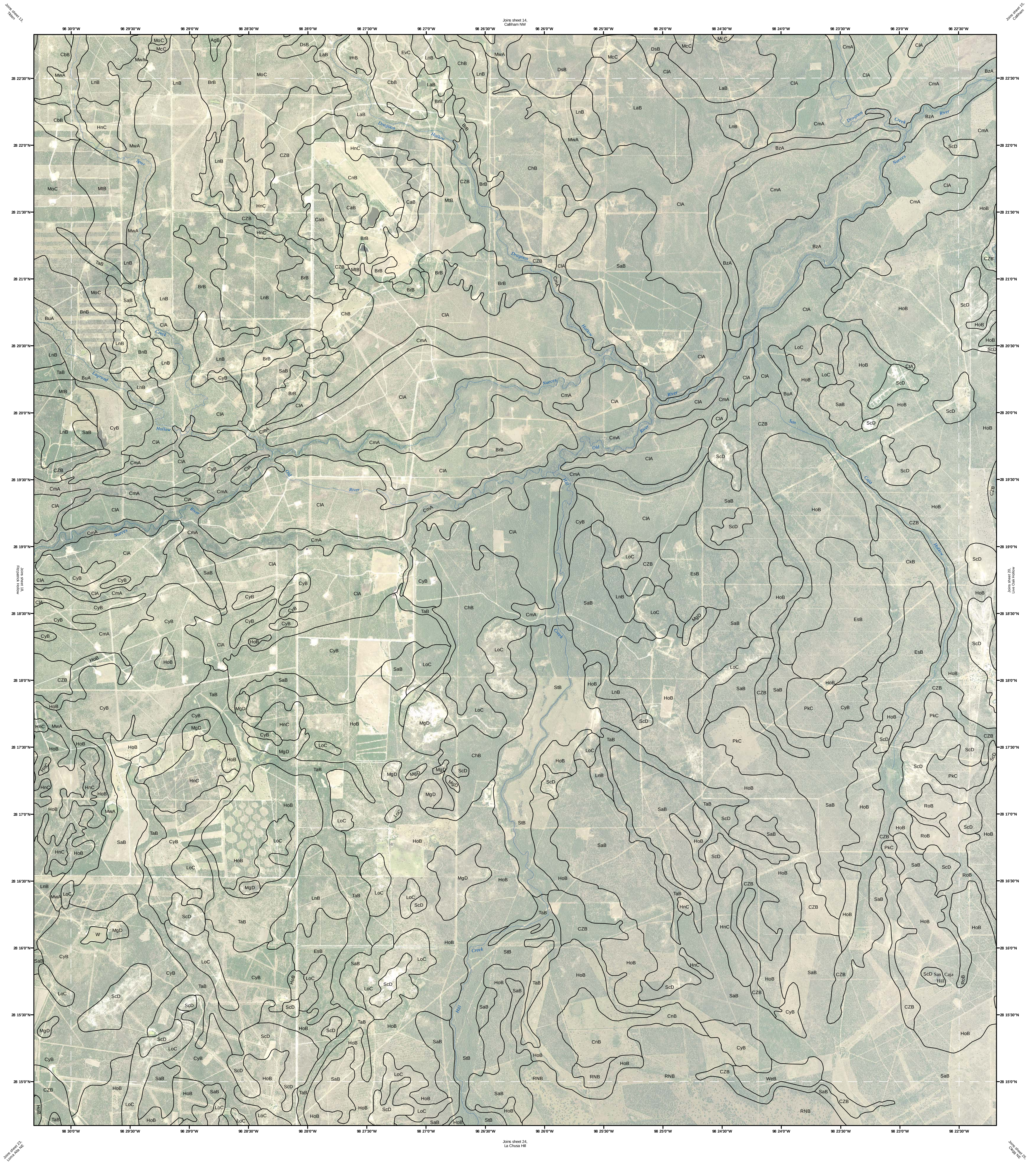
7.5 MINUTE SERIES

SHEET NUMBER 18 OF 30

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MCMULLEN COUNTY, TEXAS
SAN CAJA HILL QUADRANGLE
SHEET NUMBER 19 OF 30



Joins sheet 13, Tilden
Joins sheet 14, Calliham NW
Joins sheet 15, Calliham
Joins sheet 18, Fitzpatrick Hollow
Joins sheet 20, Live Oak Hollow
Joins sheet 23, Loma Alta NE
Joins sheet 24, La Chusa Hill
Joins sheet 25, Clegg NE
98 30'0"W
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Dragoon Hollow
Nueces River
Old River
Dragoon Creek
San Caja Hollow
Spur Creek
Hill Creek
San Caja Hill

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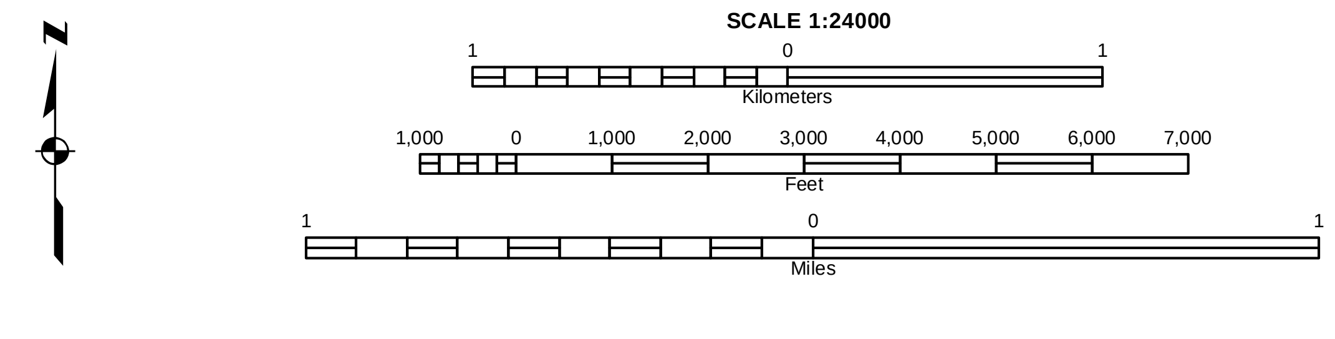
Base maps are orthophotographs prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service, from 2008 National Agriculture Imagery Program (NAIP) photography. Hydrography and cultural layers were acquired from U.S. Department of Agriculture, Natural Resources Conservation Service. The hydrography and cultural layers were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 13.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



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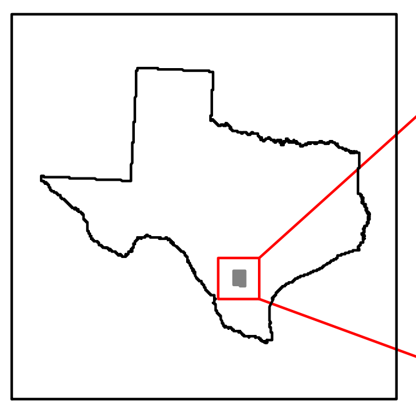
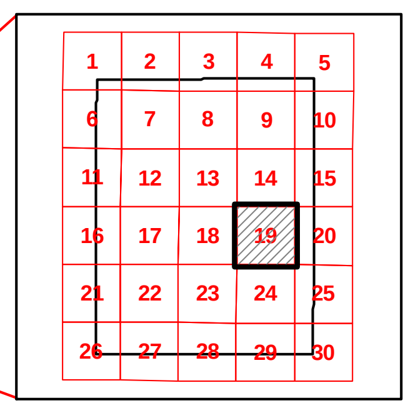


MCMULLEN COUNTY LOCATION



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QUADRANGLE LOCATION

SAN CAJA HILL, TEXAS

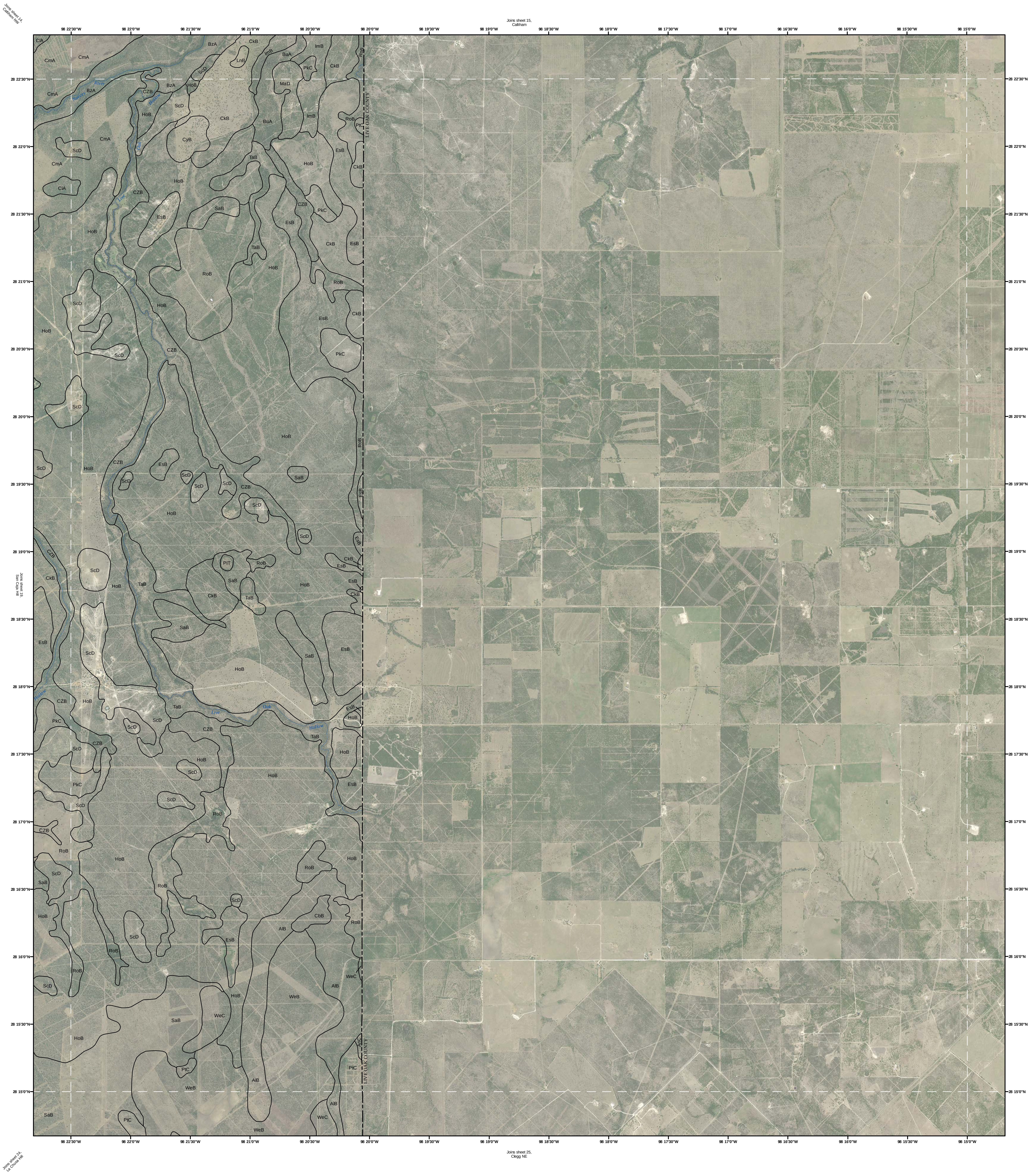
7.5 MINUTE SERIES

SHEET NUMBER 19 OF 30

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MCMULLEN COUNTY, TEXAS
LIVE OAK HOLLOW QUADRANGLE
SHEET NUMBER 20 OF 30


Joins sheet 14, Calliham NW
Joins sheet 15, Calliham
Joins sheet 19, San Caja Hill
Joins sheet 24, La Chusa Hill
Joins sheet 25, Clegg NE
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LIVE OAK COUNTY
Live Oak Hollow
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EsB
SaB
RoB
PtC
AlB
CbB
WeB
WeC

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North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 13.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

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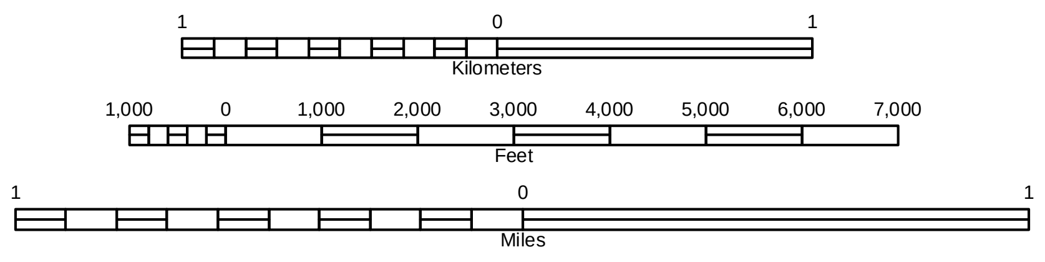
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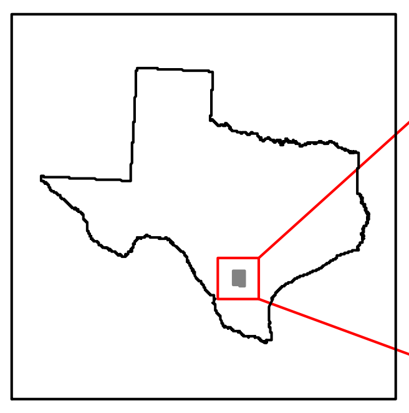
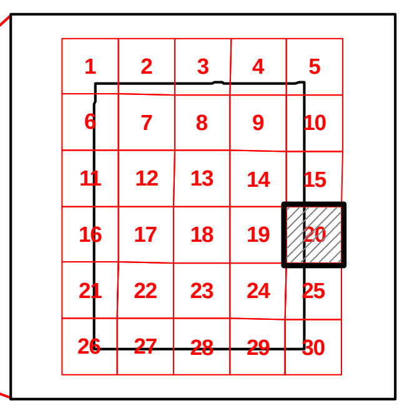


MCMULLEN COUNTY LOCATION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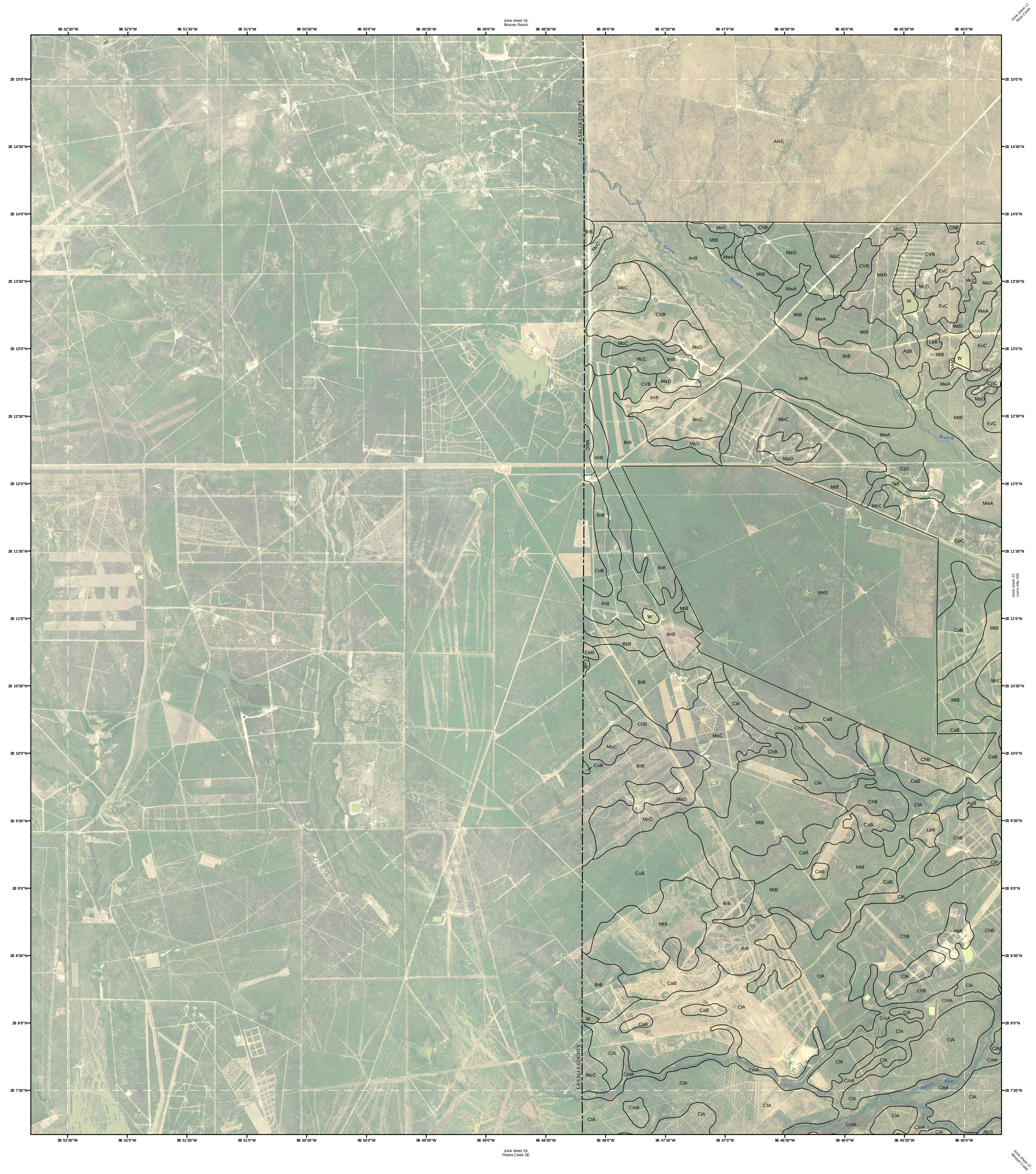
QUADRANGLE LOCATION

LIVE OAK HOLLOW, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 20 OF 30

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MCMULLEN COUNTY, TEXAS
PIEDRA CREEK NE QUADRANGLE
SHEET NUMBER 21 OF 30


Joins sheet 16,
Briscoe Ranch
Joins sheet 17,
Mule Creek
Joins sheet 22,
Loma Alta NW
Joins sheet 26,
Piedra Creek SE
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Mirasol Creek
98 52'30"W
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98 45'30"W
98 45'0"W
28 15'0"N
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LA SALLE COUNTY
LA SALLE COUNTY
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Nueces River
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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 13. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

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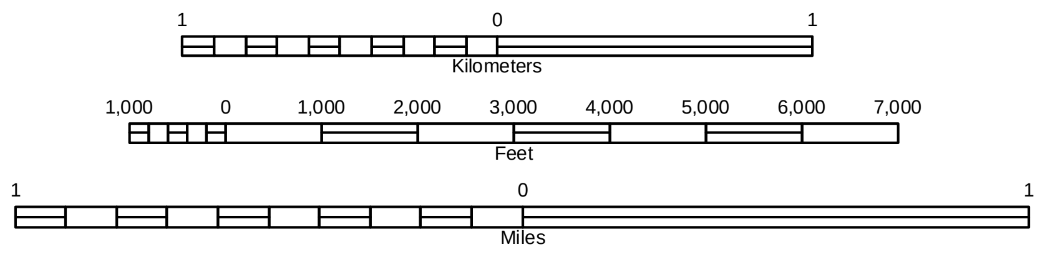
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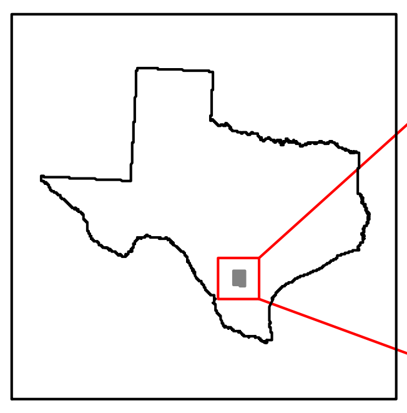
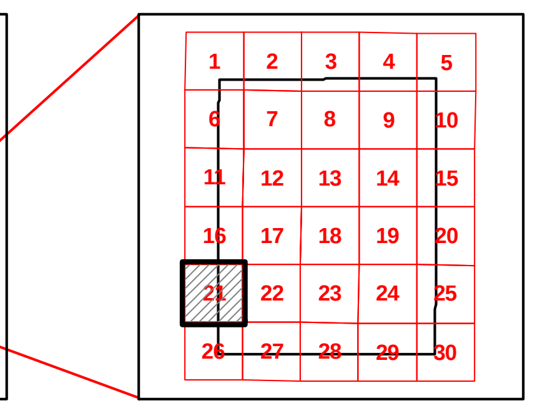


MCMULLEN COUNTY LOCATION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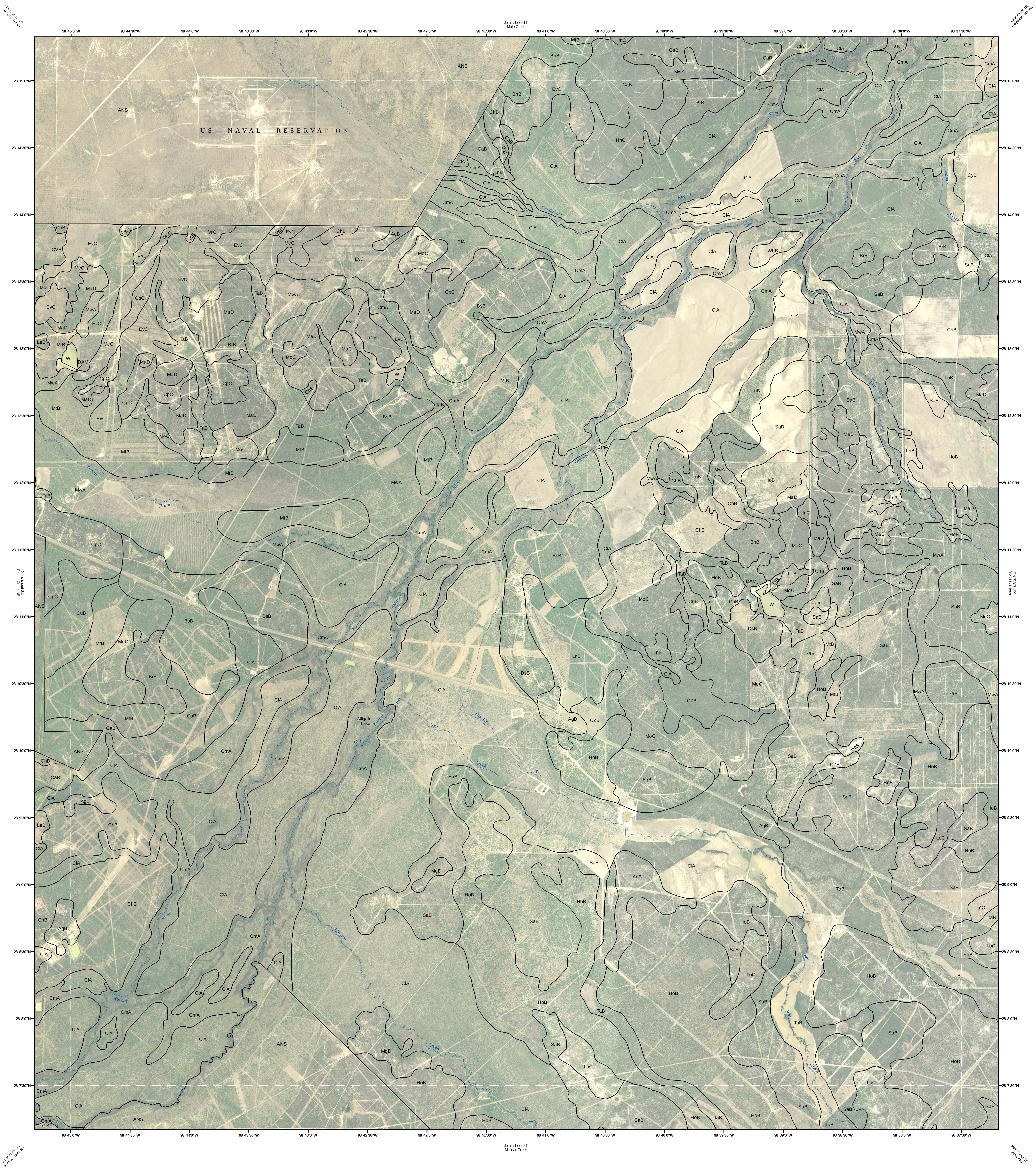
QUADRANGLE LOCATION

PIEDRA CREEK NE, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 21 OF 30

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MCMULLEN COUNTY, TEXAS
LOMA ALTA NW QUADRANGLE
SHEET NUMBER 22 OF 30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Briscoe Ranch
Joins sheet 17,
Mule Creek
Joins sheet 18,
Fitzpatrick Hollow
Joins sheet 21,
Piedra Creek NE
Joins sheet 23,
Loma Alta NE
Joins sheet 26,
Piedra Creek SE
Joins sheet 27,
Mirasol Creek
Joins sheet 28,
Loma Alta
98 45'0"W
98 44'30"W
98 44'0"W
98 43'30"W
98 43'0"W
98 42'30"W
98 42'0"W
98 41'30"W
98 41'0"W
98 40'30"W
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98 38'30"W
98 38'0"W
98 37'30"W
28 15'0"N
28 14'30"N
28 14'0"N
28 13'30"N
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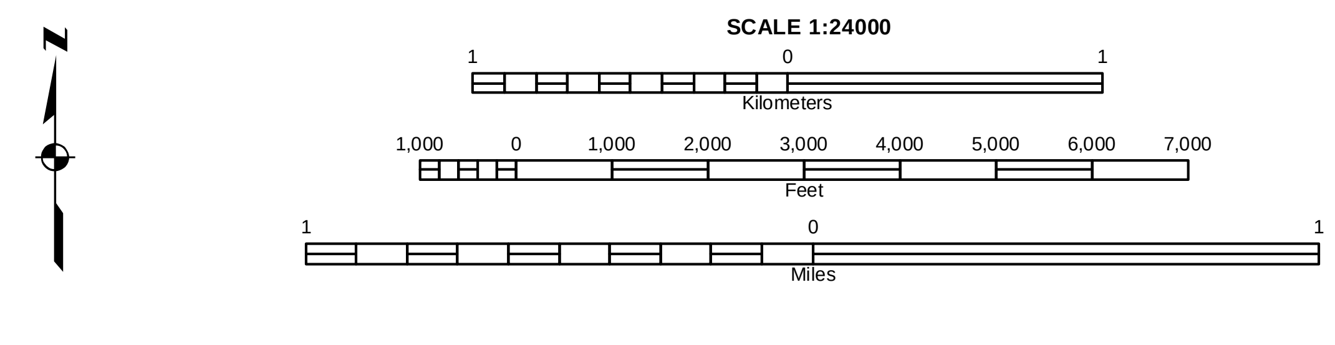
28 7'30"N
U S NAVAL RESERVATION
Alligator Lake
Nueces River
Green Branch
Guadalupe Creek
Quebrado Creek
Leoncito Creek
Yguito
Old Nueces
DAM
W
ANS
AgB
BnB
BrB
BsB
CaB
ChB
ClA
CmA
CpC
CuB
CVB
CyB
CZB
DsB
EvC
HnC
HoB
LeB
LnB
LoC
MaD
McC
MgD
MoC
MtB
MwA
SaB
TaB
VrC
WbB

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service, from 2008 National Agriculture Imagery Program (NAIP) photography. Hydrography and cultural layers were acquired from U.S. Department of Agriculture, Natural Resources Conservation Service. The hydrography and cultural layers were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 13. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.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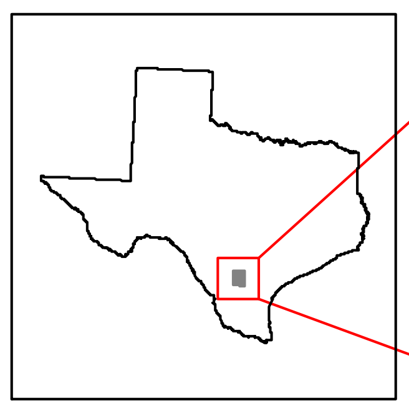
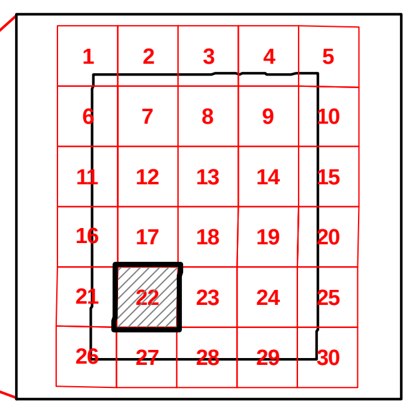
Miles



MCMULLEN COUNTY LOCATION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QUADRANGLE LOCATION

LOMA ALTA NW, TEXAS

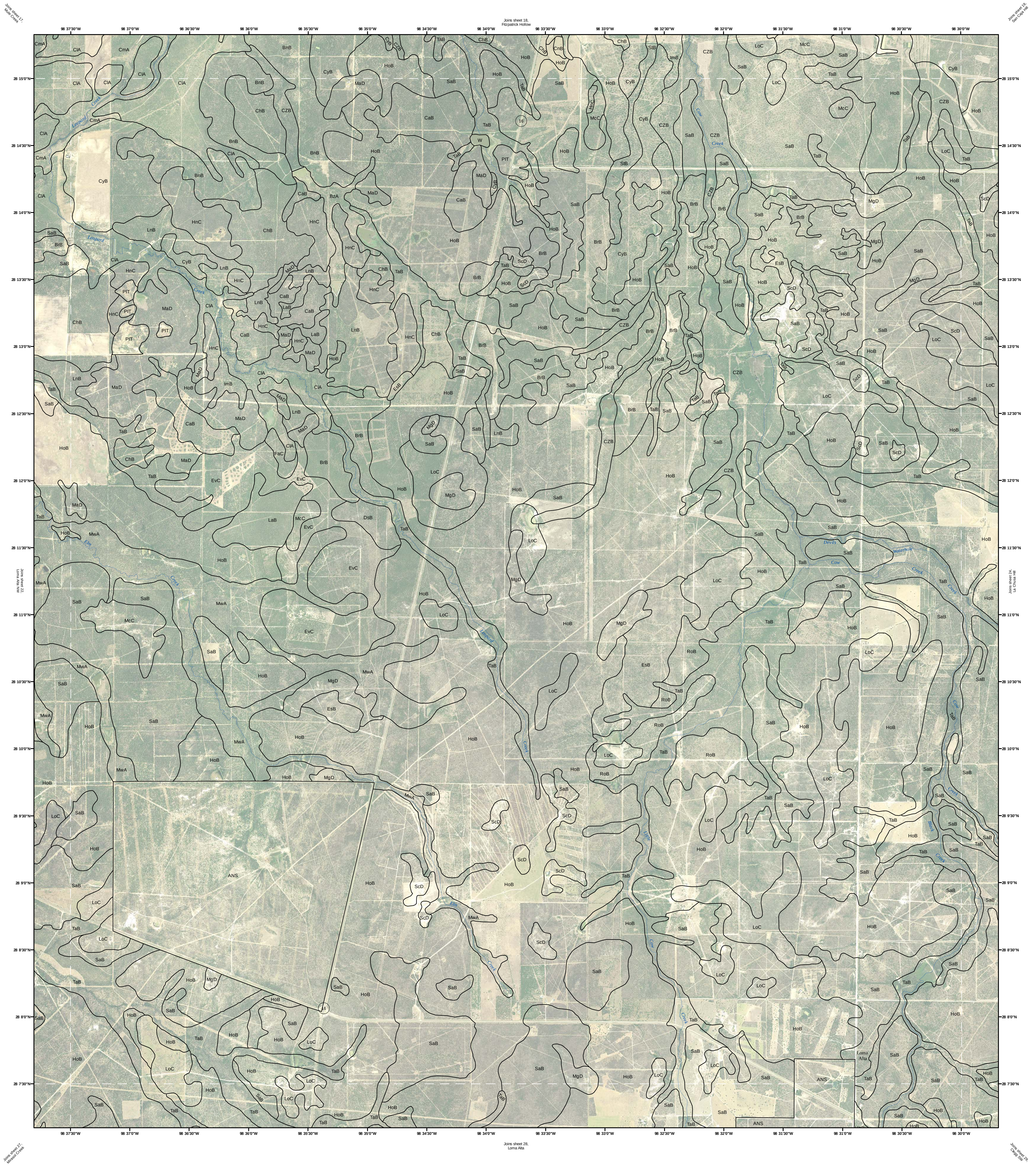
7.5 MINUTE SERIES

SHEET NUMBER 22 OF 30

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MCMULLEN COUNTY, TEXAS
LOMA ALTA NE QUADRANGLE
SHEET NUMBER 23 OF 30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Joins sheet 18, Fitzpatrick Hollow
Joins sheet 19, San Caja Hill
Joins sheet 22, Loma Alta NW
Joins sheet 24, La Chusa Hill
Joins sheet 27, Mirasol Creek
Joins sheet 28, Loma Alta
Joins sheet 29, Clegg SW
98 37'30"W
98 37'0"W
98 36'30"W
98 36'0"W
98 35'30"W
98 35'0"W
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98 33'30"W
98 33'0"W
98 32'30"W
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98 31'0"W
98 30'30"W
98 30'0"W
28 15'0"N
28 14'30"N
28 14'0"N
28 13'30"N
28 13'0"N
28 12'30"N
28 12'0"N
28 11'30"N
28 11'0"N
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28 9'30"N
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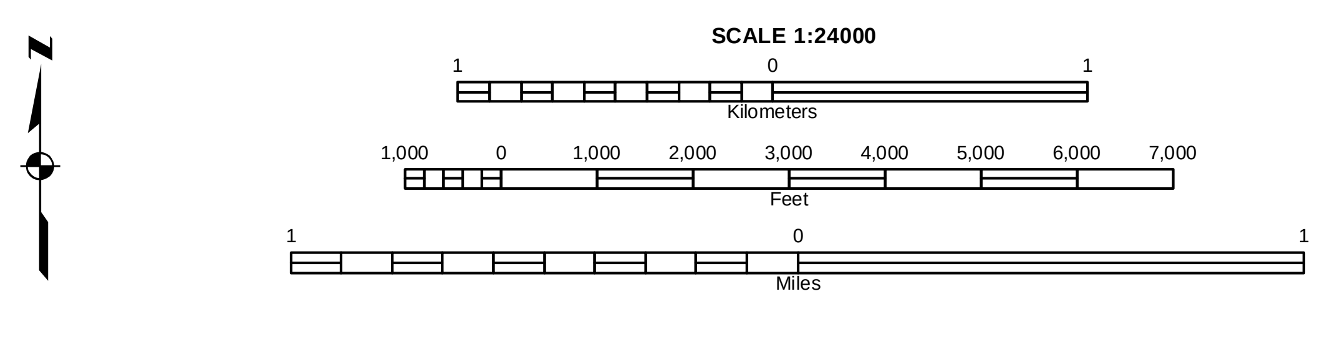
28 8'30"N
28 8'0"N
28 7'30"N

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service, from 2008 National Agriculture Imagery Program (NAIP) photography. Hydrography and cultural layers were acquired from U.S. Department of Agriculture, Natural Resources Conservation Service. The hydrography and cultural layers were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 13. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.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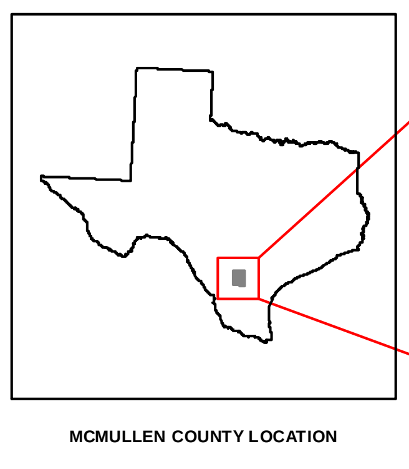
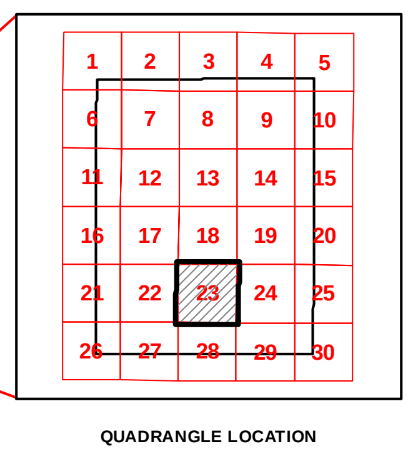


MCMULLEN COUNTY LOCATION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QUADRANGLE LOCATION

LOMA ALTA NE, TEXAS

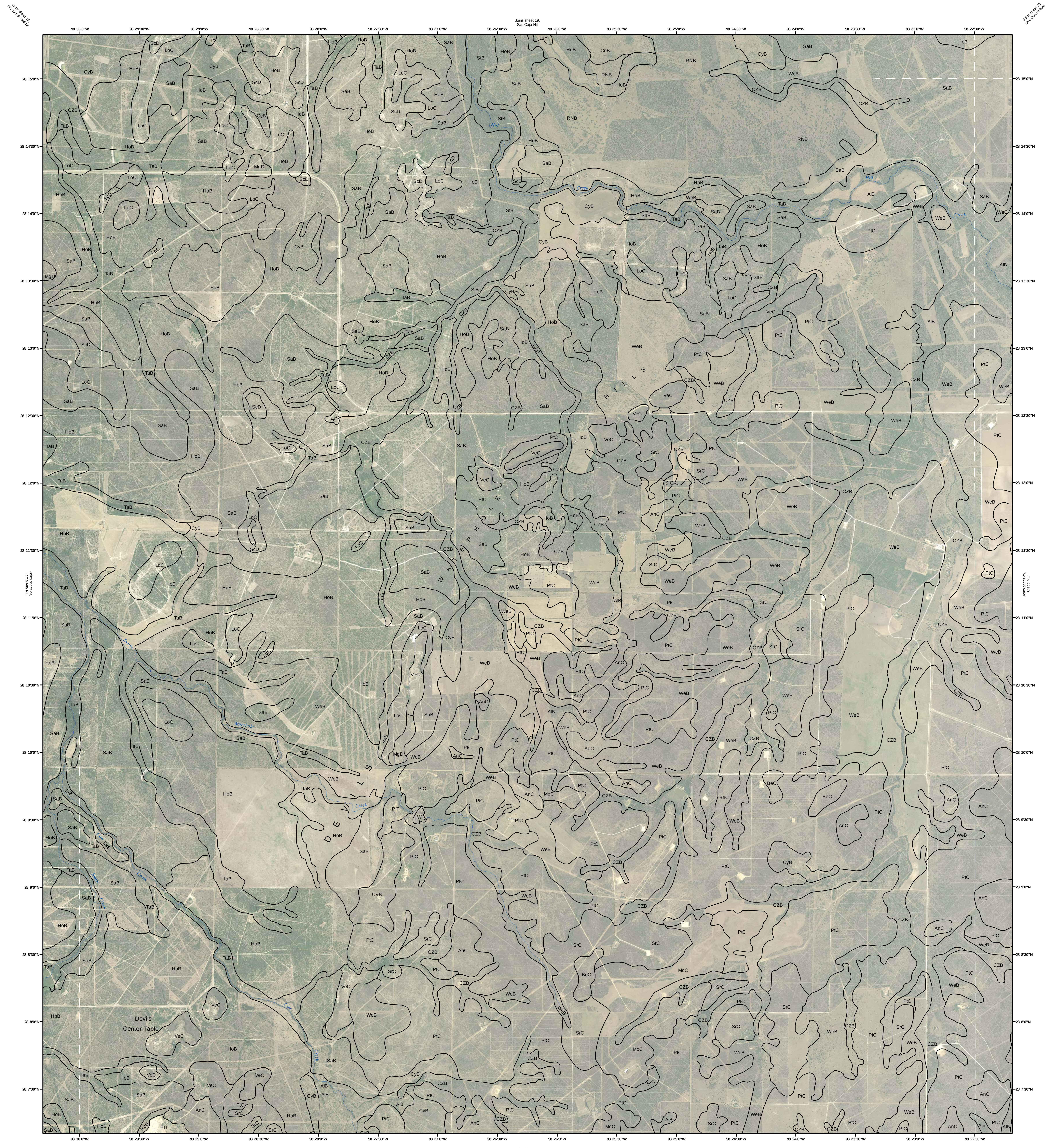
7.5 MINUTE SERIES

SHEET NUMBER 23 OF 30

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MCMULLEN COUNTY, TEXAS
LA CHUSA HILL QUADRANGLE
SHEET NUMBER 24 OF 30


Joins sheet 18, Fitzpatrick Hollow
Joins sheet 19, San Caja Hill
Joins sheet 20, Live Oak Hollow
Joins sheet 23, Loma Alta NE
Joins sheet 25, Clegg NE
Joins sheet 28, Loma Alta
Joins sheet 29, Clegg SW
Joins sheet 30, Clegg
98 30'0"W
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28 15'0"N
28 14'30"N
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WATERHOLE HILLS
DEVILS HILLS
Devils Center Table
Hill Creek
Devils Creek
Waterhole
Creek
SaB
HoB
TaB
LoC
CyB
ScD
CZB
PtC
WeB
SrC
AnC
AlB
VeC
MgD
RNB
StB
BeC
McC
CnB
CVB
PIT

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service, from 2008 National Agriculture Imagery Program (NAIP) photography. Hydrography and cultural layers were acquired from U.S. Department of Agriculture, Natural Resources Conservation Service. The hydrography and cultural layers were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 13. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

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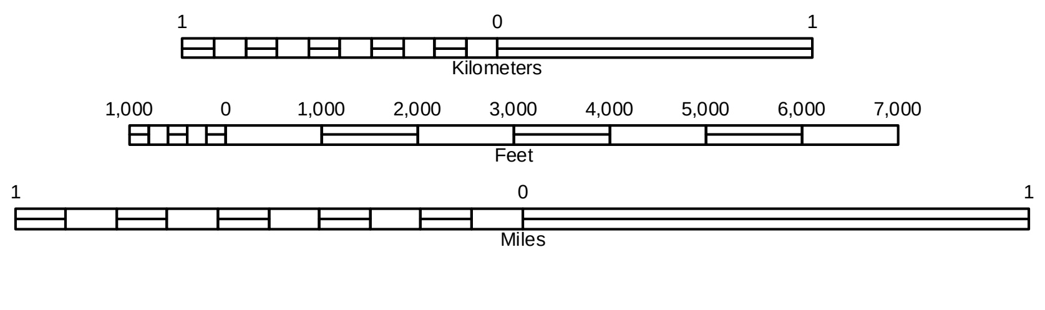
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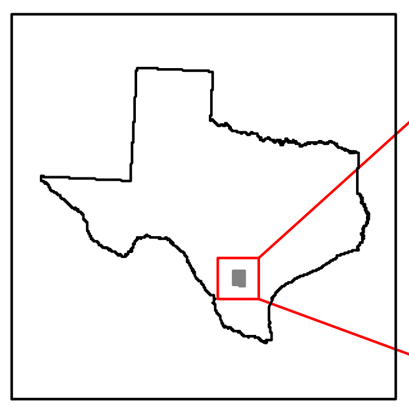
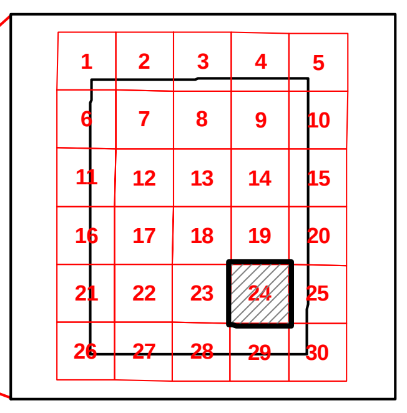


MCMULLEN COUNTY LOCATION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QUADRANGLE LOCATION

LA CHUSA HILL, TEXAS

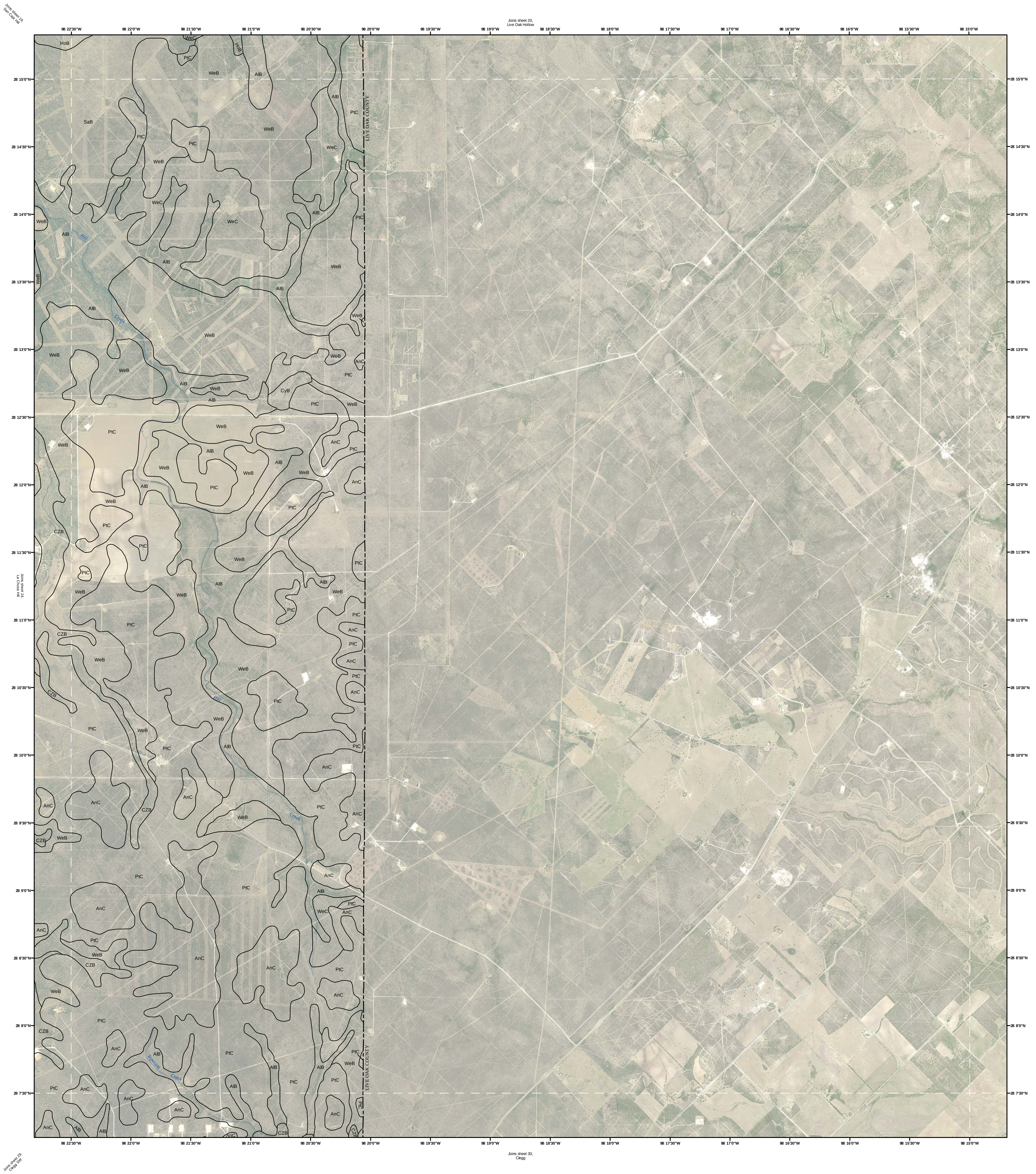
7.5 MINUTE SERIES

SHEET NUMBER 24 OF 30

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MCMULLEN COUNTY, TEXAS
CLEGG NE QUADRANGLE
SHEET NUMBER 25 OF 30


Joins sheet 19,
San Caja Hill
Joins sheet 20,
Live Oak Hollow
98 22'30"W
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Joins sheet 24,
La Chusa Hill
Joins sheet 29,
Clegg SW
Joins sheet 30,
Clegg
LIVE OAK COUNTY
HoB
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PtC
HoB
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AlB
PtC
PtC
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LIVE OAK COUNTY

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service, from 2008 National Agriculture Imagery Program (NAIP) photography. Hydrography and cultural layers were acquired from U.S. Department of Agriculture, Natural Resources Conservation Service. The hydrography and cultural layers were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 13.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

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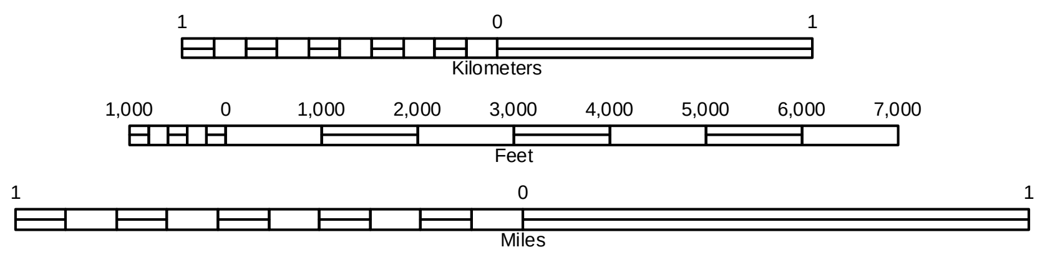
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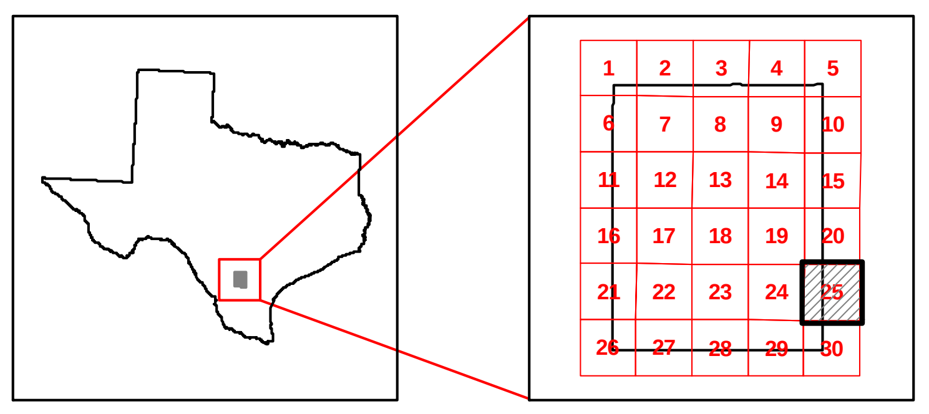
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MCMULLEN COUNTY LOCATION

QUADRANGLE LOCATION

CLEGG NE, TEXAS

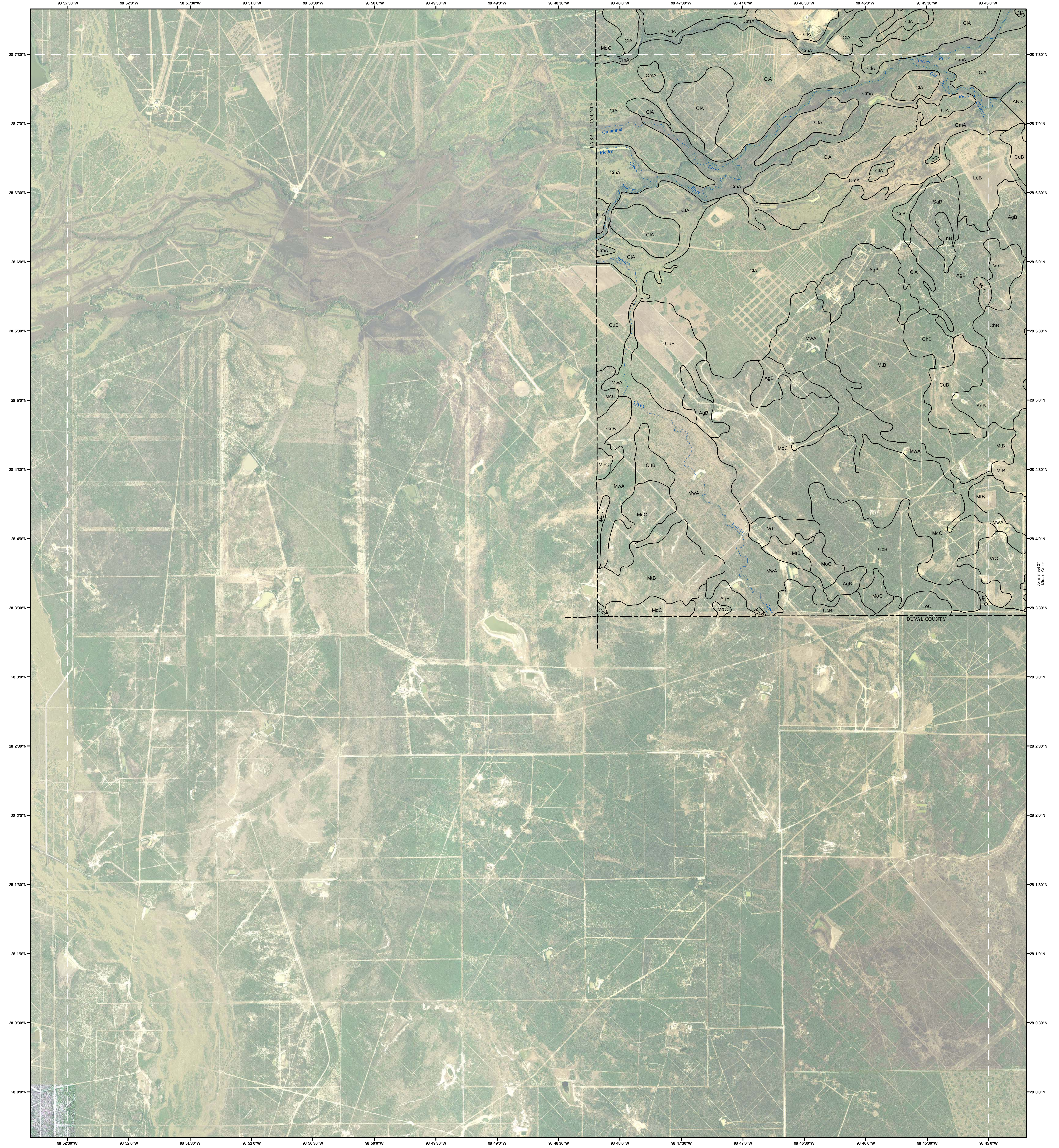
7.5 MINUTE SERIES

SHEET NUMBER 25 OF 30

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MCMULLEN COUNTY, TEXAS
PIEDRA CREEK SE QUADRANGLE
SHEET NUMBER 26 OF 30



Joins sheet 21,
Piedra Creek NE
Joins sheet 22,
Loma Alta NW
Joins sheet 27,
Mirasol Creek
98 52'30"W
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98 51'30"W
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98 45'0"W
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LA SALLE COUNTY
DUVAL COUNTY
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Piedra
Creek
Nueces
River
Old
Nueces
River
Channel
Juanita
Creek
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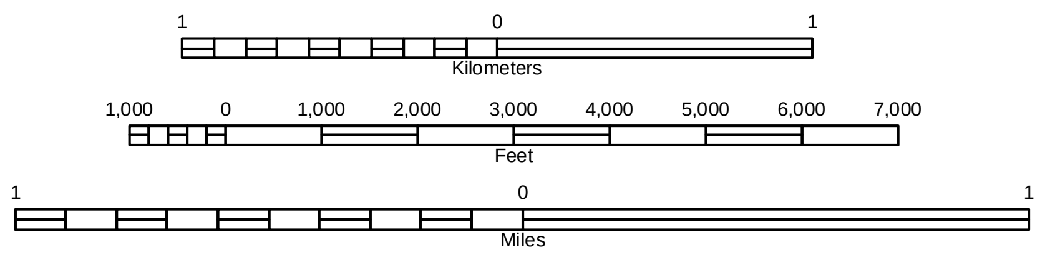
ClA
CmA
CtA
ANS
CuB
LeB
SaB
CcB
AgB
LnB
VrC
MoC
ChB
MwA
MtB
McC
LoC

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service, from 2008 National Agriculture Imagery Program (NAIP) photography. Hydrography and cultural layers were acquired from U.S. Department of Agriculture, Natural Resources Conservation Service. The hydrography and cultural layers were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 13. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

SCALE 1:24000



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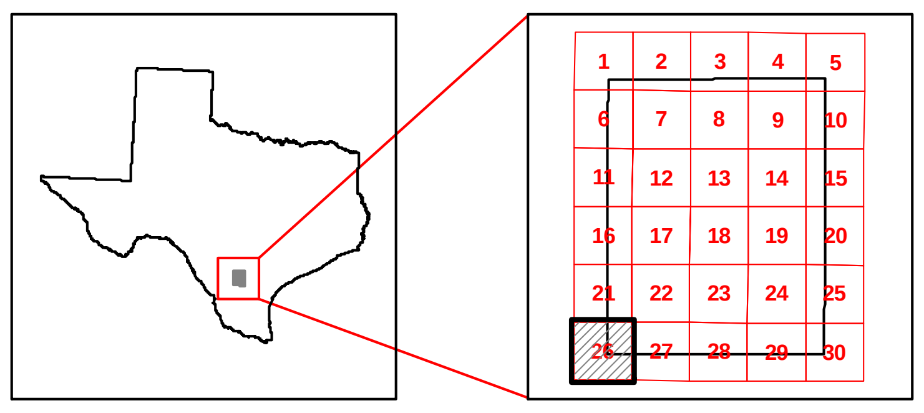

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MCMULLEN COUNTY LOCATION

QUADRANGLE LOCATION

PIEDRA CREEK SE, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 26 OF 30

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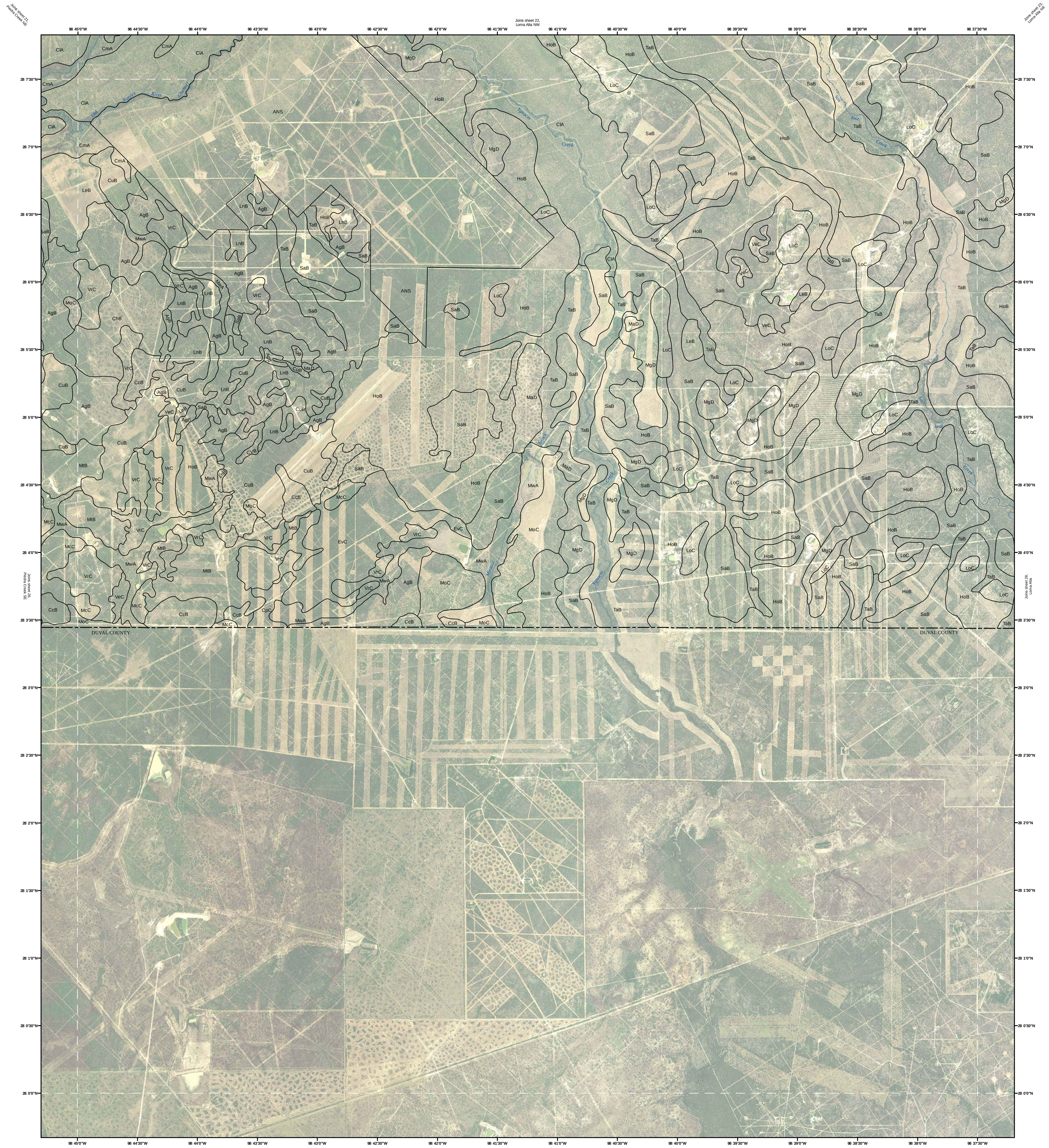
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MCMULLEN COUNTY, TEXAS
MIRASOL CREEK QUADRANGLE
SHEET NUMBER 27 OF 30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Loma Alta NW
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Loma Alta NE
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Piedra Creek SE
Joins sheet 28,
Loma Alta
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98 39'30"W
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DUVAL COUNTY
DUVAL COUNTY
Old Nueces River Channel
Tiposa Creek
San Jose Creek
Mirasol Creek
ClA
CmA
ANS
MgD
HoB
TaB
LoC
SaB
LeB
CuB
LnB
AgB
VrC
MwA
MoC
ChB
CcB
VeC
MaD
MtB
McC
EvC
CyB

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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 13. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

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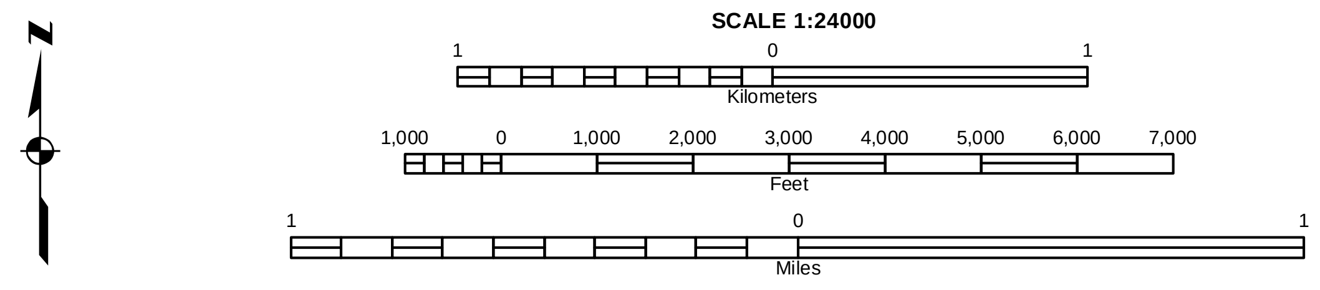
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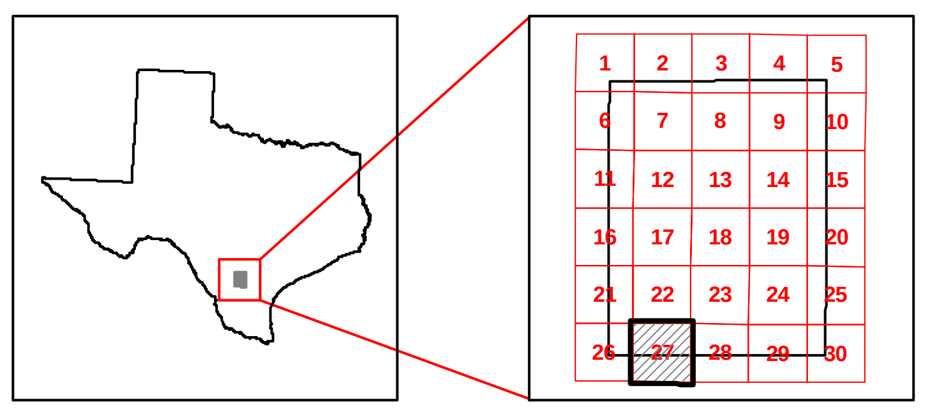
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MCMULLEN COUNTY LOCATION

QUADRANGLE LOCATION

MIRASOL CREEK, TEXAS

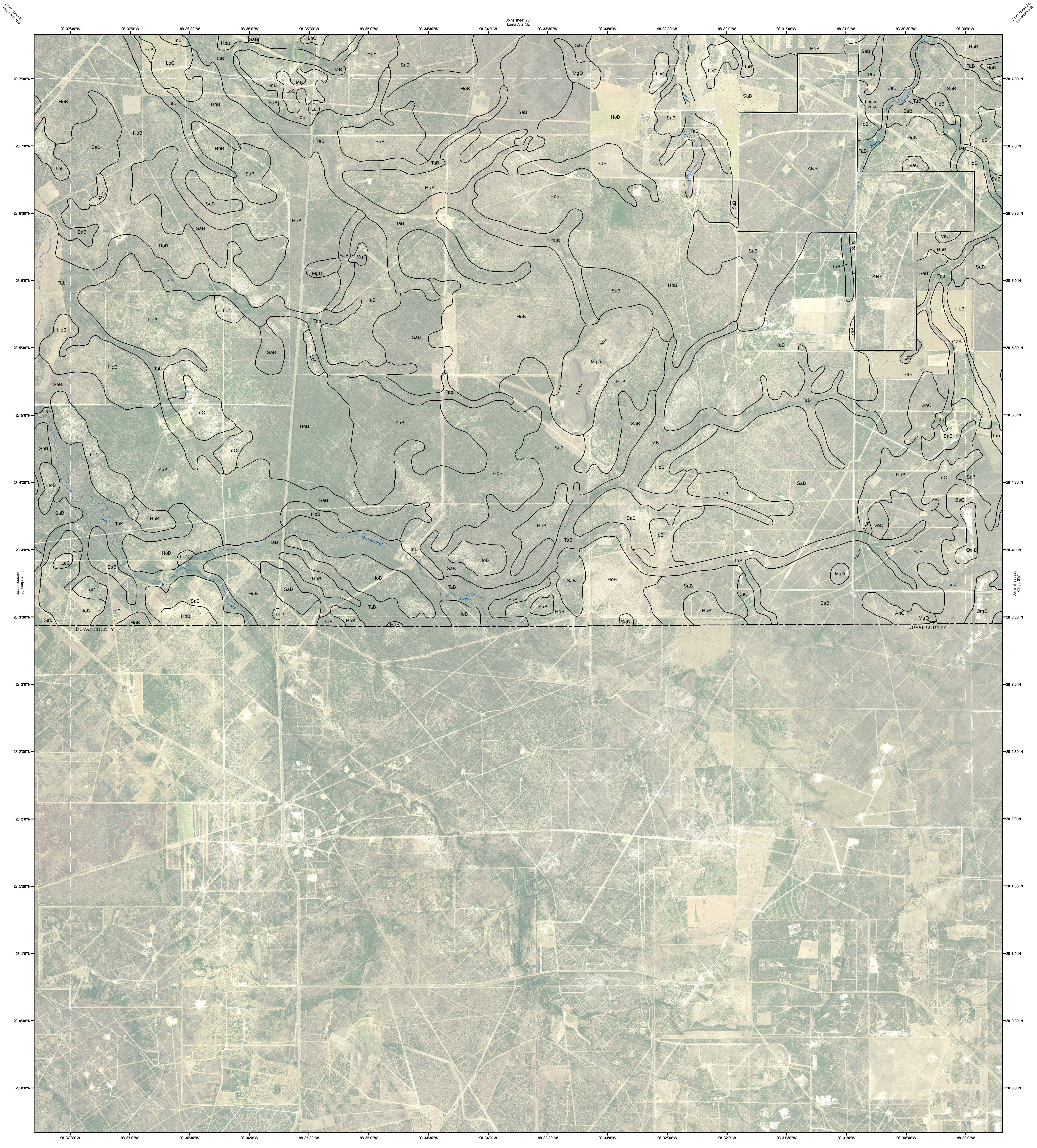
7.5 MINUTE SERIES

SHEET NUMBER 27 OF 30

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MCMULLEN COUNTY, TEXAS
LOMA ALTA QUADRANGLE
SHEET NUMBER 28 OF 30


Joins sheet 22, Loma Alta NW
Joins sheet 23, Loma Alta NE
Joins sheet 24, La Chuza NE
Joins sheet 27, Mustang Creek
Joins sheet 29, Clegg SW
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98 37'0"W
98 36'30"W
98 36'0"W
98 35'30"W
98 35'0"W
98 34'30"W
98 34'0"W
98 33'30"W
98 33'0"W
98 32'30"W
98 32'0"W
98 31'30"W
98 31'0"W
98 30'30"W
98 30'0"W
28 7'30"N
28 7'0"N
28 6'30"N
28 6'0"N
28 5'30"N
28 5'0"N
28 4'30"N
28 4'0"N
28 3'30"N
28 3'0"N
28 2'30"N
28 2'0"N
28 1'30"N
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28 0'30"N
28 0'0"N
HoB
SaB
TaB
LoC
MgD
ANS
VeC
BeC
AnC
CZB
OmD
Tab
Loma Alta
Drummond Creek
Creek
16
DUVAL COUNTY

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N

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Kilometers

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Feet

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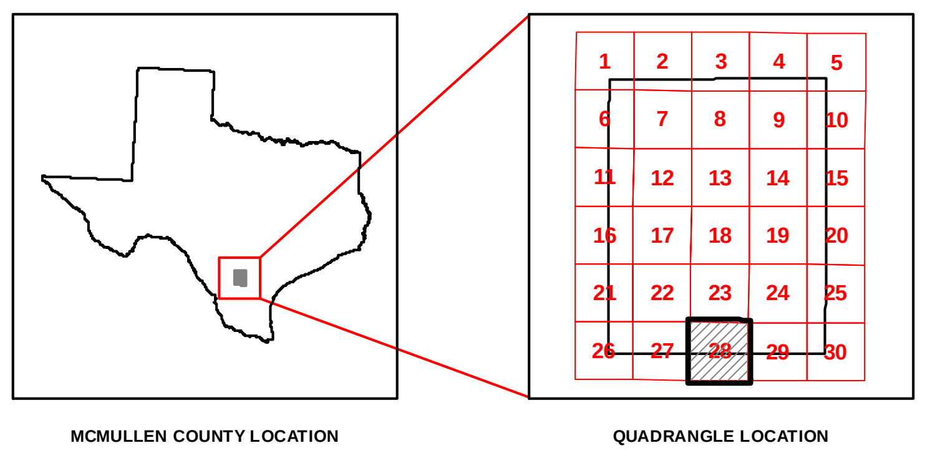
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MCMULLEN COUNTY LOCATION

QUADRANGLE LOCATION

LOMA ALTA, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 28 OF 30

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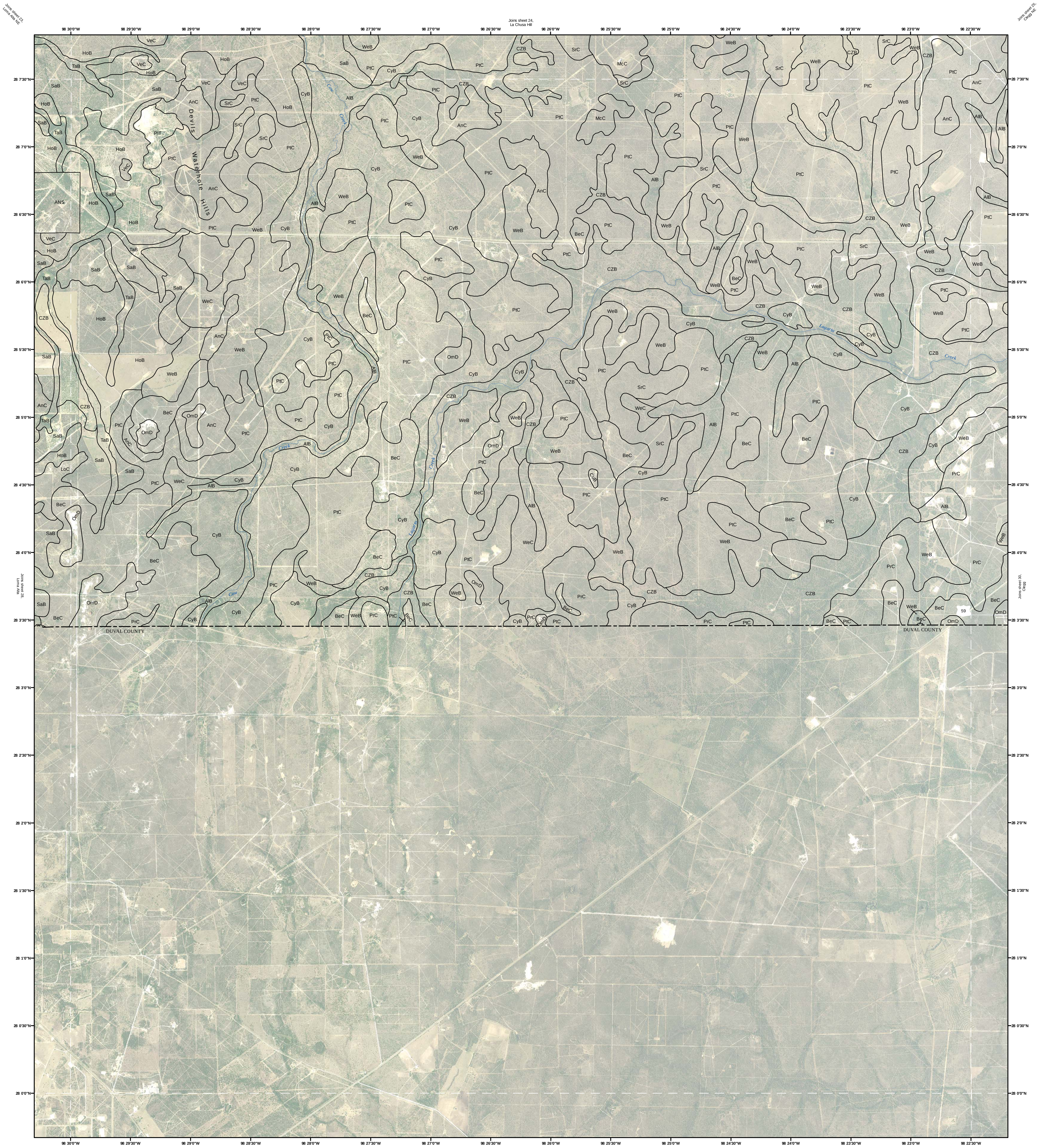
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MCMULLEN COUNTY, TEXAS
CLEGG SW QUADRANGLE
SHEET NUMBER 29 OF 30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Loma Alta NE
Joins sheet 24,
La Chusa Hill
Joins sheet 25,
Clegg NE
Joins sheet 28,
Loma Alta
Joins sheet 30,
Clegg
98 30'0"W
98 29'30"W
98 29'0"W
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98 26'0"W
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98 23'0"W
98 22'30"W
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28 7'0"N
28 6'30"N
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28 1'30"N
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28 0'30"N
28 0'0"N
Devils Waterhole Hills
Cow Creek
Laguna Creek
DUVAL COUNTY
59
ANS
HoB
TaB
SaB
VeC
AnC
SrC
PtC
CyB
AlB
WeB
CZB
McC
BeC
OmD
LoC
PrC
WeC
PIT

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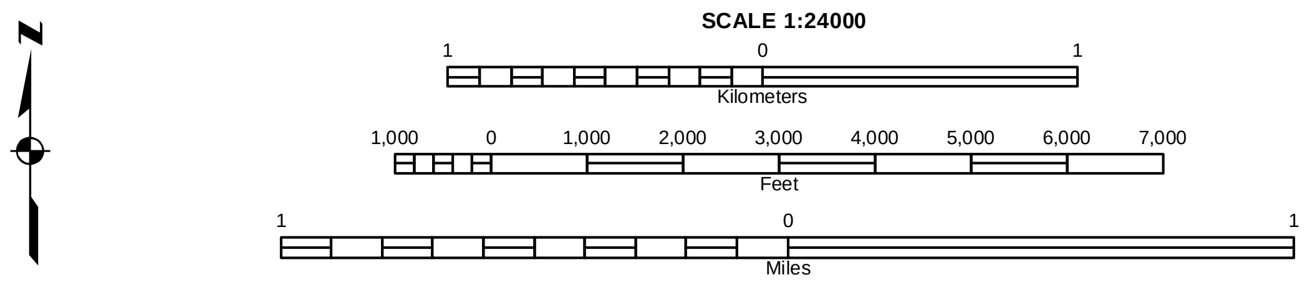
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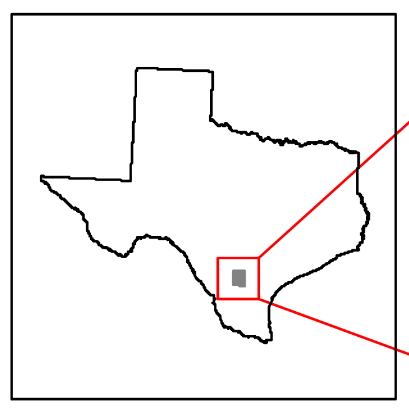
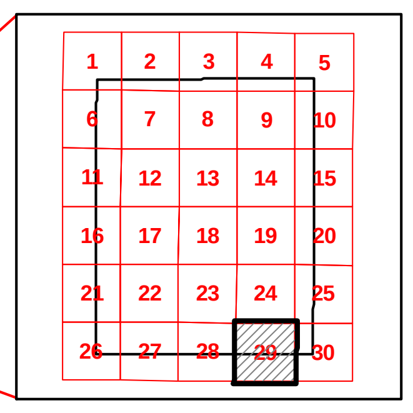

MCMULLEN COUNTY LOCATION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QUADRANGLE LOCATION

CLEGG SW, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 29 OF 30

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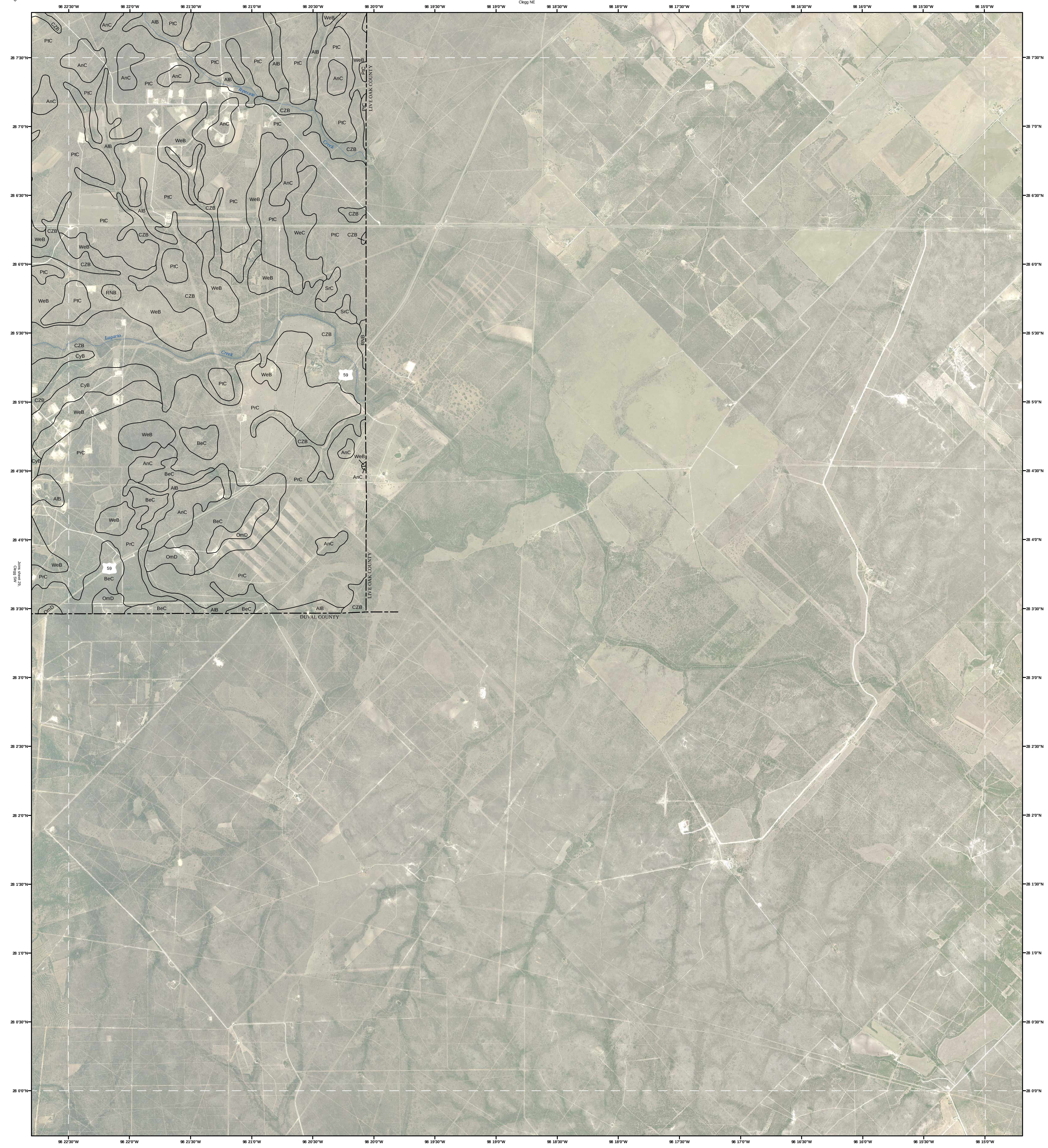
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MCMULLEN COUNTY, TEXAS
CLEGG QUADRANGLE
SHEET NUMBER 30 OF 30

Joins sheet 24,
La Chusa Hill

Joins sheet 25,
Clegg NE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98 15'30"W
98 15'0"W
28 7'30"N
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Joins sheet 29,
Clegg SW
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AlB
Esperanza
CZB
AnC
PtC
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AlB
WeB
Creek
CZB
PtC
AnC
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AlB
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RNB
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Lagarto
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Creek
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PtC
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AnC
WeB
OmD
PrC
59
BeC
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CZB
LIVE OAK COUNTY
LIVE OAK COUNTY
DUVAL COUNTY

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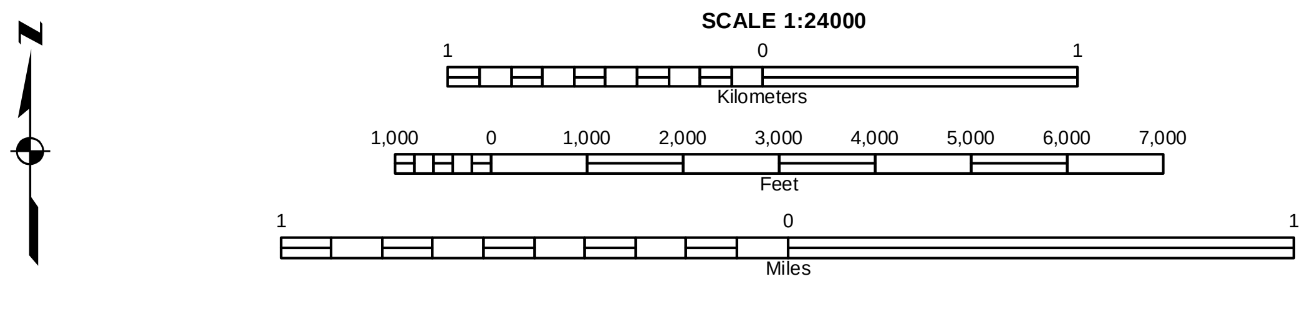
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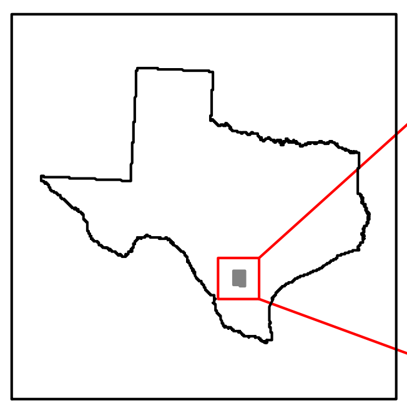
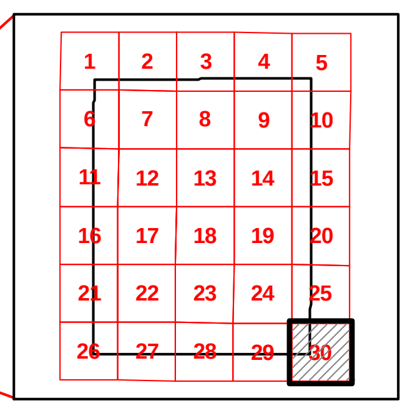

MCMULLEN COUNTY LOCATION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QUADRANGLE LOCATION

CLEGG, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 30 OF 30

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